Appendix J
Refined Sediment Management Areas

PDI Evaluation Report

Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling

Portland Harbor Superfund Site
Portland, Oregon

AECOM Project Number: 60566335
Geosyntec Project Number: PNG0767A

June 17, 2019

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CERTIFICATION

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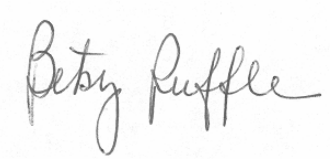

June 17, 2019

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Date

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ACRONYMS AND ABBREVIATIONS

1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-hexachlorodibenzofuran
1,2,3,7,8-PeCDD	1,2,3,7,8-pentachlorodibenzo-p-dioxin
2,3,4,7,8-PeCDF	2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
2,3,7,8-TCDF	2,3,7,8-tetrachlorodibenzofuran
AECOM	AECOM Technical Services
BEHP	bis(2-ethylhexyl)phthalate
bml	below mudline
BRV	bed replacement value
cm	centimeter
COC	contaminant of concern
CUL	cleanup level
cy	cubic yard
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DDx	dichlorodiphenyltrichloroethane and its derivatives
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
Geosyntec	Geosyntec Consultants, Inc.
GIS	geographic information system
GSI	GSI Water Solutions Inc.
mg/kg	milligrams per kilogram
NAPL	non-aqueous phase liquid
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	Pre-Remedial Design Investigation
Pre-RD AOC Group	Pre-Remedial Design Agreement and Order on Consent Investigation Group
PRG	preliminary remediation goal
PTW	Principal Threat Waste
RAL	remedial action level

RAO	Remedial Action Objective
RI	remedial investigation
RM	river mile
ROD	Record of Decision
Site	Portland Harbor Superfund Site
SMA	sediment management area
SRS	stratified random sample
SWAC	spatially weighted average concentration
TPH	total petroleum hydrocarbon

1. INTRODUCTION

The Pre-Remedial Design Agreement and Order on Consent Group (Pre-RD AOC Group) for the Portland Harbor Superfund Site (Site) in Portland, Oregon, has developed and implemented a Pre-Remedial Design Investigation (PDI) for the Site. The Site Record of Decision (ROD) (United States Environmental Protection Agency [EPA] 2017) described a post-ROD sampling effort for the Site to delineate and better refine the sediment management area (SMA) footprints, refine the Conceptual Site Model, determine baseline conditions, and support remedial design. The PDI studies were conducted by the Pre-RD AOC Group pursuant to a PDI Work Plan (Geosyntec Consultants, Inc. [Geosyntec] 2017) as a foundational step to update current conditions since collection of data during the Remedial Investigation/Feasibility Study (RI/FS; EPA 2016a, 2016b).

The Site is located on a 10-mile stretch of the lower Willamette River from river mile (RM) 1.9 upstream to RM 11.8. The Site covers approximately 2,200 acres[1] of an active industrial, commercial, and urbanized harbor and is located immediately downstream of the urban downtown. There are two reaches located immediately upstream of the Site. The Downtown Reach, which includes the urbanized area of downtown Portland, is defined by EPA as extending from RM 11.8 to RM 16.6. EPA defines the Upriver Reach as extending from RM 16.6 to RM 28.4. Collectively, RM 11.8 to RM 28.4 is referred to as the Downtown/Upriver Reach.

1.1 Rationale

This appendix presents the methodology implemented for mapping the Refined SMAs (Figure 1) and calculating the associated volumes of sediment based on depths of 3 feet and 5 feet below mudline (bml). The methodology used for generating the SMAs was generally similar[2] to that used by EPA for development of the ROD SMA footprint. SMAs are areas where surface sediment concentrations of at least one of the six focused contaminants of concern (COCs)[3] exceeds its corresponding remedial action level (RAL), and active remediation may be needed. According to the ROD, "*SMAs represent areas with contaminant concentrations in surface sediment where natural recovery is not occurring or is not likely to be effective in reducing concentrations of COCs within a reasonable time frame*" (EPA 2017, page 59). The PDI presents Refined SMAs based on 2018 surface sediment data, supplemented with historical surface sediment data for spatial

[1] The ROD states the Site is approximately 2,190 acres and extends from RM 1.9 to RM 11.8. However, when mapped in GIS, the 2,190 acres only covers the area from RM 1.9 to 11.6 (at the end of the authorized navigation channel). The acreage from RM 1.9 up to RM 11.8 is more accurately 2,203 acres. The Site-wide spatially weighted average concentrations (SWACs) for the remedial RAL analysis were adjusted to cover this larger area.

[2] Differences between EPA's methodology in the ROD and methodology used in this report include the dataset used for generating Natural Neighbor interpolations and post-GIS processing of areas with GIS anomalies.

[3] The six focused COCs are total polychlorinated biphenyls (PCBs), total polycyclic aromatic hydrocarbons (PAHs), dichlorodiphenyltrichloroethane and its derivatives (DDx), 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), 1,2,3,7,8-pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD), and 2,3,4,7,8-pentachlorodibenzofuran (2,3,4,7,8-PeCDF).

coverage. The Refined SMA mapping process uses the updated RALs presented in Appendix I and summarized in Table 1 for the six focused COCs.[4]

2. METHODS FOR REFINED SMA MAPPING

This section describes the following methods and sequential steps used to generate the Refined SMAs:

1. Select data sources (PDI and relevant historical surface sediment) and compile into a single dataset for each focused COC.
2. Interpolate individual COC data results between RM 1.9 to RM 11.8 using the Natural Neighbor algorithm to produce raster grid cells for each focused COC. Steps 1 and 2 were completed for the PDI Footprint Report to delineate the Preliminary Refined SMAs.
3. Identify interpolation grid cells exceeding the updated RAL for that specific COC.
4. Merge the individual focused COC maps of RAL exceedances into a single SMA map showing RAL exceedance areas for all focused COCs.
5. Conduct post-geographic information system (GIS) adjustments.

After delineating the Refined SMA footprint, the volumes of sediment were estimated based on depths of 3 feet and 5 feet below the 2018 mudline within the SMAs. Each of these steps is described below.

2.1 Data Sources Used for SMA Mapping

The dataset used for Refined SMA mapping is referred to as the PDI SMA dataset. It consists of the 2018 stratified random samples (SRS) and SMA surface sediment samples (0 to 30 centimeters [cm]), called the PDI dataset, supplemented with historical surface (shallower than 40 cm) sediment data from the EPA FS database (2016b) and post-FS datasets collected between 2013 to 2016 (GSI Water Solutions Inc. [GSI] 2014; Kleinfelder 2015; NewFields 2016; Geosyntec 2016), as described in Appendix C.2. Historical data were used to increase sample density/spatial coverage for SMA mapping (i.e., fill data gaps). Table 2 lists the data sources, validation results, year of sample collection, and sample location count for each sub-dataset used to compile the PDI SMA dataset. The PDI SMA dataset was also described in the PDI Footprint Report (AECOM Technical Services [AECOM] and Geosyntec 2019), where Preliminary Refined SMAs were mapped with this dataset using the ROD RALs. The same dataset was used in this report.

[4] The Preliminary Refined SMA footprint (AECOM and Geosyntec 2019) used the same mapping dataset but ROD RALs.

2.2 Compilation of Data for SMA Mapping

Compilation of the PDI SMA dataset entailed selecting the most recent and spatially representative data. Historical samples located within 100 feet of more recent samples analyzed for the same focused COC were removed from the PDI SMA dataset in two sequential steps:

1. Post-FS data (2013 to 2016 collection years) replaced FS data (2002 to 2004 collection years).
2. PDI data (2018 collection year) replaced post-FS and FS data.

This method of sequential replacement of historical data prioritized the use of newer data for Refined SMA mapping. Table 3 documents the replacement of historical samples within 100 feet of post-FS and PDI samples; additional analysis regarding historical FS samples and new 2018 PDI samples is presented in Appendix D.2 and summarized in Exhibit A. Figure 2 shows the 100-foot replacement process used.

Similar to the EPA FS, the 2018 PDI dataset addressed duplications by averaging primary results with duplicate results. For post-FS data, the samples had some variabilities in summing methodologies across individual compounds, so to avoid potential inaccuracies of averaging data points, the maximum result of any duplicate sample was selected.

2.3 Remedial Action Levels

Updated RALs used to generate Refined SMAs are presented in Appendix I and summarized in Table 1 for the six focused COCs. As described in Appendix I, RAL curves were developed to select the optimal RAL for each focused COC, similar to the approach used by EPA in the ROD. RAL curves present a relationship between the Site-wide SWAC, the acres remediated, and the point-based concentration needed to achieve the Site-wide target SWAC. The Site-wide SWAC selected as the target for each focused COC considered background sediment concentrations, ROD targeted post-construction SWACs, ROD cleanup levels (CULs), and the preliminary remediation goals (PRGs) for selected ROD Remedial Action Objectives (RAOs). The RAL curve plots acres of remediated sediment versus resultant SWACs, and from this curve, a target SWAC and RAL were selected. Appendix I describes the detailed methods that were followed to select the target SWAC and identify the resulting RAL for each focused COC.

2.4 Natural Neighbor GIS Interpolation

The PDI SMA dataset for the focused COCs was interpolated with Natural Neighbor methodology into a 10-by-10-foot raster grid for each focused COC separately, following a similar method used by EPA in the ROD (details are provided in Appendix G of the PDI Footprint Report).[5] The

[5] On December 3, 2018, the Pre-RD AOC Group received the raster grids and Python code used by EPA to generate the ROD SMAs, allowing the Pre-RD AOC Group to replicate EPA's methodology described in Appendix D of the Final FS (EPA 2016b). On November 4, 2018, the Pre-RD AOC Group met with EPA to discuss in-depth details of how to replicate EPA methodology for mapping SMAs in the ROD. Natural Neighbor interpolation was used to generate grid cells with a concentration for the focused COCs throughout the Site.

interpolation results are shown for each focused COC in Figures 3 through 6. A merged map of RAL exceedance areas was then created in GIS by overlaying the RAL exceedance layers for the focused COCs (Figure 7). Specific steps in the preparation of these combined figures are as follows:

- Data were divided into four regions for Natural Neighbor interpolation: the east side of the river, west side of the river, navigation channel, and Swan Island Lagoon. Each region was interpolated separately and then combined (i.e., raster mosaicked) into a single Site-wide interpolation map for each focused COC (Figures 3 through 6). The regional division of the Site was the same approach used by EPA in the ROD.
- In each focused COC map, the grid cells exceeding the relevant RALs (nearshore and navigation channel) were identified (yellow or orange in Figures 3 through 6).
- Individual raster grids of RAL exceedances (one for each focused COC) were merged (i.e., raster unioned) to present the cumulative RAL exceedances together in one map. All grid cells with a RAL exceedance for one or more focused COC were identified (Figure 7).
- The merged natural neighbor RAL exceedance maps show two incremental footprints (pre-GIS adjustment): a footprint for three focused COCs (total PCBs, total PAHs, and DDx) and a larger footprint for all six focused COCs (Figure 7).
- 2018 PDI dioxin/furan samples with RAL exceedances were plotted on Figure 7 and shown as either detect or non-detect. This figure illustrates the dioxin/furans-focused areas.

The Site boundaries used for RAL interpolations and delineation of the Refined SMAs extended from RM 1.9 to RM 11.8.

2.5 Post-GIS Adjustments

Post-GIS processing was conducted on the interpolated map showing the combined RAL exceedances for the six focused COCs. Post-GIS processing was implemented primarily for two scenarios:

- GIS Anomalies: Locations where the interpolation extended through upland properties were excluded from the Refined SMAs.
- Capped Areas: Areas where the Refined SMAs were interpolated through a capped portion of the Site were removed, unless a PDI sample collected on the cap exceeded an updated RAL.

No adjustments were made to map the non-aqueous phase liquid (NAPL) areas identified by EPA in the ROD (Figure 8). GIS anomalies and adjustments are identified in Figures 9a through h. Isolated RAL exceedances were included in the Refined SMA footprint. These exceedances may not be practicable for remediation, and multiple types of observations should be reviewed during remedial design to confirm these are actionable cleanup areas (e.g., surface and subsurface

chemistry concentrations and exceedance factors, substrate type, bathymetry, chemistry of nearby sample results for the same analyte, and extent of capped areas).

2.6 Differences from ROD SMA Mapping Methods

The SMA mapping approach used in this appendix generally followed similar methods used by EPA in the FS and ROD, with a few notable modifications described below:

- Updated RALs described in Appendix I were used to map RAL exceedances and generate Refined SMAs.
- The Site boundaries used for RAL interpolations and delineation of the Refined SMAs extended from RM 1.9 to RM 11.8. In the ROD, these boundaries ended at RM 11.6 (end of the navigation channel), and thus the SMA mapping methodology presented in this appendix differs slightly from that in the ROD. Additional grids were added to the raster grid provided by EPA, thus extending it 0.2 RM up to RM 11.8, the upstream end of the Site. There is no navigation channel in this section of the river, so the grids bisect the river as east and west.
- Two SMA footprints are shown, one for three focused COCs (total PCBs, total PAHs, and DDx) and a second that includes all six focused COCs, including the three dioxin/furan congeners (TCDD, PeCDD, and PeCDF). Results are expressed as two SMA footprints because of different data density and the uncertainty related to the quantification and treatment of dioxin/furan data at the lower levels of detection (see Appendix E discussion).
- Post-GIS adjustments were made to the GIS output files.
- The ROD considered Principal Threat Waste (PTW) areas during the generation of the SMA footprint. Figure 8 presents the ROD NAPL PTW footprint with the updated RAL exceedance areas from the PDI SMA mapping dataset. PTW NAPL areas were not included in the Refined SMAs. PTW highly toxic concentrations from the ROD also were not used for SMA mapping because the subsistence fisher pathway risks fall below the 1×10^{-3} threshold (See PDI Evaluation Report, Section 3.6.1). A few 2018 PDI cores contained NAPL-like observations (blebs, tar balls, and staining; see Appendix D.3); however, no mobility testing was conducted on these cores. It is expected that NAPL mobility will be evaluated during remedial design (see Appendix K for discussion of PTW). After additional characterization during remedial design, some of these areas may be included in the SMA footprint. Relevant PDI observations include the following:
    - The 2018 PDI sampling event shows that surface sediment samples collected in the navigation channel that were within the ROD NAPL footprint were below the updated RALs for the focused COCs.
    - The ROD NAPL footprint is primarily neutral or depositional (see Figure 4d from Appendix D.1).

3. RESULTS

Figure 10 presents the Refined SMAs based on updated RALs. The methodology discussed in this appendix resulted in Refined SMA footprints with less acreage than the ROD SMA footprint. Acreage, volumes, and post-construction SWACs associated with these refined footprints are discussed in this section. The locations of non-focused sediment COCs that exceeded ROD CULs (listed in ROD Table 17 for sediments) were compared to the Refined SMA footprints to evaluate protectiveness of the other COCs. Post-construction risks immediately after remediation are discussed in Section 4 of this appendix.

3.1 Refined SMA Footprint Acreage

The three-focused-COC Refined SMA footprint generally falls within the ROD SMA footprint, confirming the overall stability of contaminated areas. The Figure 10 series presents the Refined SMA footprints for three focused COCs (total PCBs, total PAHs, and DDx) and all six focused COCs (total PCBs, total PAHs, DDx, TCDD, PeCDD, and PeCDF). Refined SMA footprints were generated with and without the three focused dioxin/furan COCs because of limited data density and uncertainty in the dioxin/furan dataset, including a large number of qualified results at or close to the ROD CULs and RALs (see Section 3.5 and Appendix E).

The Refined SMAs are 111 and 143 acres for the three-focused-COC footprint and six-focused-COC footprint, respectively. The SMA footprints have been reduced by 67% and 61% respectively, from 365 acres presented in the ROD. Table 4 presents the change in SMA acreage among the Proposed Plan SMAs, the ROD SMAs, the proposed PAH Explanation of Significant Difference (ESD) SMAs, the Preliminary Refined SMAs (documented in the PDI Footprint Report using the ROD RALs with the PDI SMA mapping dataset [AECOM and Geosyntec 2019]), and the Refined SMAs (updated RALs with PDI SMA mapping dataset).

The revised SMA footprints are protective of human health and the environment. The three-focused-COC SMA footprint, through co-location with the non-focused COCs, encompass most of the Site risk and are therefore the basis for the SMA footprint. Figure 7 shows that the detected dioxin/furan-focused COC RAL exceedances are primarily located within the three-focused-COC SMA footprint. In other words, if non-detect data are not used to delineate SMAs, these three dioxins/furans are generally co-located with the other three focused COCs (total PCBs, total PAHs, and DDx).

3.2 Updated Sediment Volumes

The estimated volume of sediment within the Refined SMAs is presented in Table 4. Sediment volumes, calculated with assumed depths of 3 feet bml and 5 feet bml, are 537,000 and 895,000 cubic yards (cy), respectively, for the three-focused-COC Refined SMA footprint. These estimates do not precisely represent the bottom of RAL exceedances nor do they represent dredge volumes. Contaminated sediment volumes and applicable remedial technologies will be determined during remedial design. Future designs will likely evaluate the inventory of sediment volume above RALs

in the authorized navigation channel and clearance requirements for capping. These Site conditions will be factored into dredge volume requirements, along with capping, enhanced natural recovery, and monitored natural recovery considerations, as described in Appendix L.

For comparison, the ROD ESD contaminated sediment volume was approximately 3,623,000 cy; other comparisons are also shown in Table 4.

3.3 Post-Construction SWACs (Time 0) for the Focused COCs

For each focused COC, the post-construction (Time 0) Site-wide SWAC was estimated by simulating "remediation" of the Refined SMAs. SWACs were calculated by replacing the grid cell concentrations within the SMAs with the bed replacement value (BRV)[6] used in Appendix I for the RAL curves. Table 5 presents the BRVs and the resulting post-construction Site-wide SWACs for the three-focused COC and six-focused COC Refined SMA footprints. The SWACs do not consider natural recovery that may occur between the 2018 PDI sampling and remedy construction.

The post-construction SWACs are similar to the selected target SWACs used for the RAL curves presented in Appendix I for all focused COCs except total PAHs (Table 5). Reasons for the differences are (i) the RAL curves were calculated assuming the entire Site has the same RAL; for SMA mapping, two RALs were used (navigation channel RAL and RAL outside navigation channel); and (ii) the RAL curves used the 2018 PDI dataset, but the SMA delineation was based on the SMA mapping dataset, which included historical data. The PDI dataset was used for the RAL curves because it represents current Site conditions; while, the PDI SMA mapping dataset provides better data density in and around SMA boundaries.

The RAL inside the navigation channel is higher than the Site-wide RAL (applicable in nearshore areas outside the navigation channel). The effect of using the navigation channel RAL was most evident on post-construction Site-wide SWACs compared to target Site-wide SWACs for total PAH. For the other five focused COCs, most of the Site-wide RAL exceedances occur in the nearshore areas and, as a result, the post-construction Site-wide SWAC was similar to the target Site-wide SWAC. Total PAH exceed the Site-wide RAL inside the navigation channel in many places. The SMA mapping used the navigation channel RAL used in the proposed ESD (170,000 micrograms per kilogram), which is about five times higher than the Site-wide RAL.

3.4 Other COCs Addressed by SMAs

EPA identified six focused COCs in the ROD based primarily on co-location with other COCs, toxicity, and significance in risk assessment. The ROD determined that a remedial action based on the focused COCs sufficiently addressed the majority of Site risks. Refined SMA footprints are also intended to address Site risk related to non-focused COCs identified in ROD Table 17. The 18 non-focused COCs with sediment CULs but no RALs are aldrin, arsenic, bis(2-

[6] BRVs are discussed in Appendix I, Section 2.2, and are based on the 2018 PDI median upstream surface sediment concentration.

ethylhexyl)phthalate (BEHP), cadmium, chlordanes, copper, dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyltrichloroethane (DDT), dieldrin, gamma-BHC [lindane], lead, mercury, 1,2,3,4,7,8-hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF), 2,3,7,8-tetrachlorodibenzofuran (2,3,7,8-TCDF), total petroleum hydrocarbon (TPH) diesel, tributyltin, and zinc. Tables 6a and 6b present PDI surface sediment sample counts of non-focused COCs relative to inclusion within the three-focused-COC and six-focused-COC Refined SMA footprints, respectively.[7] Results are compared to exceedance factors of the ROD CUL: 1x the CUL, 5x the CUL, and 10x the CUL.

Findings for the Refined SMA footprint based on the three focused COCs (111 acres) include the following (Table 6a) (excluding dioxin/furans):

- Over 98% of 2018 PDI surface sediment samples with non-focused COC concentrations above 10x their respective CULs were located within the footprint (excluding dioxin/furans). BEHP was detected in three samples, dieldrin was detected in seven samples, and mercury and TPH-diesel were each detected in one sample outside the footprint.

- Over 94% of 2018 PDI surface sediment samples with non-focused COC concentrations above 5x their respective CULs were located within the footprint.

- Two non-focused furan congeners (1,2,3,4,7,8-HxCDF and 2,3,7,8-TCDF) show widespread exceedances of their ROD CULs, indicating that the ROD background-based CULs are below current background conditions. In addition, the dioxins/furans have a large number of JN-qualified results (see Section 3.5 and Appendix E); therefore, results are uncertain.

- Arsenic exceeded the ROD CUL in 96% of PDI samples that were analyzed for arsenic. Arsenic has an elevated regional background signature, and the ROD background-based CUL has been updated based on the PDI data to 4.0 milligrams per kilogram (mg/kg), which is similar to the Site-wide surface sediment 95% Upper Confidence Limit of 5.0 mg/kg for arsenic (see Appendix F.1).

- For ten of the non-focused COCs, 99% or more of the PDI samples with 1x CUL exceedance are located within the footprint (aldrin, cadmium, copper, DDD, DDE, DDT, lindane, lead, tributyltin, and zinc).

Results of the CUL exceedance analysis for the six-focused-COC Refined SMA footprint (143 acres; Table 6b) are consistent with findings of the three-focused-COC Refined SMA footprint (111 acres) discussed above.

[7] Sample counts differ among non-focused COCs because the SRS samples were analyzed for the full suite of sediment COCs listed in ROD Table 17, whereas SMA samples were analyzed only for the focused COCs.

3.5 Areas of Potential Uncertainty

Potential sources of uncertainty in generating the Refined SMAs include the following:

- **Qualified Dioxin/Furan Results.** The dioxin/furan analytical results for solid media (surface and subsurface sediments, sediment trap, and fish tissue samples) collected for the PDI contain a substantial number of qualified results. The data qualifiers assigned by the laboratory and/or the project data validator include J-flagged values, indicating an "estimated" result and JN-flagged values, indicating the analyte is tentatively identified and the result is estimated. JN-flagged values are associated with results reported by the laboratory as "estimated maximum possible concentrations". The frequency and types of laboratory- and data validator-qualified results in each dataset need to be considered carefully in determining data uses (see Appendix A).

  Appendix E evaluates the uncertainty associated with qualified data for the three dioxin/furan congeners listed in the ROD as focused COCs (2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,6,7,8-PeCDF) and identifies concentration ranges where reported concentrations are estimated and/or uncertain and how that may affect the data uses for specific project analyses. Further, Appendix E proposes a means to address uncertainties for the dioxin/furan data applications and makes the following conclusions:

  - The analysis shows that a large number of the qualified results are close to the congener detection limits.
  - Additionally, the ROD CULs and RALs are at or close to the detection limits. Accuracy of results close to the detection limits is reduced due to uncertainties associated with the analytical method.
  - The qualified sample concentrations within the dataset lead to some fundamental limitations in the use of the PDI dioxin/furan dataset, including decision-making related to remedy design and implementation at the Site.

- **Age of Data and Incorporation of Historical RI/FS Data.** The RALs were selected with the 2018 PDI dataset (SMA and SRS); however, the SMA mapping dataset supplemented the PDI dataset with historical data to maintain adequate spatial data density. The historical data were collected from 1997 (RI/FS) to 2015 (post-FS) and were included in the SMA mapping dataset only if they were located more than 100 feet from a newer sample location. Although use of these historical data helped in the delineation of SMA boundaries, earlier data may no longer be representative of current Site conditions because (i) some of the data are over 20 years old, and (ii) the new bathymetry survey data show the Site is predominately depositional. SWACs in depositional areas have decreased since 2004 and are expected to have decreased since 1997. Therefore, current concentrations in depositional areas near SMAs are likely lower than the concentrations at historical locations from the RI/FS. Additional design-level sampling will address this uncertainty during area-specific remedial design.

- **Interpolation Methods.** The Site was divided into four regions (east side, west side, navigation channel, and Swan Island Lagoon) for GIS Natural Neighbor interpolation, similar to the approach used by EPA in the ROD. The division into regions within the GIS model may not fully reflect the actual Site conditions and contamination extents near the navigation channel boundaries.
- **NAPL-Like and Separate-Phase Observations.** NAPL-like material, including blebs, tar balls, and staining, as described in the PDI subsurface field sampling field logs, was observed by field staff in a few cores collected from RM 5 to RM 6. These observations correlate strongly with elevated PAH results. However, because NAPL mobility tests were not conducted in the field, observance of NAPL-like products does not necessarily correlate to mobility. As such, NAPL observations were not utilized in the mapping of SMAs (Figure 8).
- **Exclusion of PTW.** ROD-identified PTW highly toxic concentrations and PTW-not reliably contained areas were not used to delineate the Refined SMAs. Primarily, PTW-highly toxic, as defined in the ROD, is not relevant to the current site risk and the unsupported food web model (see Appendices G and H). Cap modeling demonstrated that the PCB PTW highly toxic concentration (200 µg/kg) can be reliably contained (Appendix K).
- **Minimum Constructible Area.** The Refined SMAs include small, isolated areas of RAL exceedances that would not be considered "constructible" based on a minimum size for equipment mobilization. An isolated 10-by-10-foot area is too small of an area to justify mobilization of barge and dredge equipment. Other regional programs and projects discuss minimum daily material volumes of about 2,000 to 4,000 cy (barge size) and/or a 130-by-130-foot area (see EPA FS Appendix D, Table D2.O; AECOM 2012). Area-specific minimum constructability and implementability considerations will be addressed during remedial design.

4. EVALUATION OF POST-CONSTRUCTION RISKS

Post-construction risks (Time 0) for human health direct contact (RAO 1) were calculated using post-construction nearshore sediment SWACs for the focused COCs. SWACs were calculated on a RM and Site-wide basis excluding the navigation channel for consistency with EPA's approach for evaluating human direct contact exposure to nearshore sediment (RAO 1) (EPA 2016c). Direct contact risks were calculated for the tribal fisher, who had the highest in-water sediment exposures in the FS/ROD and is the basis of EPA's risk-based PRGs for RAO 1. Evaluation on a RM east/west bank basis addresses the potential for the tribal fisher's exposure to sediment to occur over a smaller spatial scale than Site-wide. Risks were calculated using the pre- and post-construction SWACs, which were derived from the Refined SMAs for three focused COCs (PCBs, DDx, and total PAHs only) and all six focused COCs. The calculation of benzo(a)pyrene toxicity equivalence from the total PAH SWACs was performed using the regression equation provided in the FS (Appendix D, Section D5).

Table 7 presents pre- and post-construction direct contact risks based on the nearshore sediment Site-wide SWACs calculated for the three-focused-COC and six-focused-COC Refined SMA footprints. Risk reduction is 51% (cancer) to 66% (noncancer) for the three-focused-COC SMA footprint and 64% (cancer) to 73% (noncancer) for the six-focused-COC SMA footprint. The post-construction Site-wide and RM nearshore sediment direct contact risks and hazards are below EPA's long-term direct contact risk management targets for the Site (cancer risk of 10^{-6} and hazard index of 1) (EPA 2016c). On a RM basis, post-construction risks and hazards are all below 10^{-6} and a hazard index of 1 for both the three-focused-COC and six-focused-COC SMA footprints (Tables 8a and 8b, respectively). Based on the significant overlap of non-focused COCs within the Refined SMAs (see Section 3.4), the additional risk posed by these COCs is not expected to result in exceedance of the risk management targets. Risk calculations are presented in Exhibit B.

Post-construction benthic risks were calculated based on Thiessen polygon interpolation of areas with RAO 5 ecological COCs exceeding 10x the PRG, consistent with the approach used in the FS/ROD. A GIS analysis was performed to identify areas where post-construction concentrations for the ecological COCs exceed 10x RAO 5 PRGs. Thiessen polygons were considered remediated if the PDI sample driving the RAO 5 exceedance was within the updated SMA footprint. As shown in Figure 11, 72% of the total RAO 5 benthic risk area (22.1 of 30.7 acres) is captured within the Refined SMA footprint (three focused COCs). EPA's post-construction interim target for RAO 5 of 50% reduction in the area posing unacceptable benthic risk was achieved.

Updated post-construction risks from fish consumption (RAO 2) were not calculated due to the lack of a reliable method for predicting fish tissue concentrations from sediment concentrations (see Appendix H for a discussion of EPA's food web model). However, the change in COC fish tissue concentrations between the RI and PDI, using smallmouth bass as an indicator species for resident fish, demonstrates that a significant reduction in fish consumption risk has already occurred in the absence of remediation.

Upstream and regional inputs of PCBs, mercury, and other COCs limit the reduction in fish consumption risk that can be achieved at the Site, as acknowledged by EPA in the ROD Responsiveness Summary (EPA 2017):

> *EPA recognizes that the remedy likely will not reduce the concentrations of PCBs and other contaminants to levels low enough to allow for consumption at the higher consumption rates associated with subsistence fishing.*
>
> *Fish advisories would likely remain in effect following the cleanup.*

In summary, the post-construction risks and hazards calculated using the Refined SMA footprints with or without the dioxin/furan-focused COCs achieves EPA's interim risk management targets. For RAO 1 (human direct contact with nearshore sediment), EPA's long-term risk management targets are met on both a Site-wide and RM scale immediately post-construction. For all potential direct contact and fish consumption exposure scenarios, additional post-remedy risk reduction will continue to be achieved as the Site converges on background conditions.

5. REFERENCES

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TABLES

Table 1. Remedial Action Levels Used for SMA Mapping

Analyte	ROD RALs		Updated PDI RALs	
	Site-wide and Outside Nav. Channel (µg/kg)	Inside Navigation Channel (µg/kg)	Outside Nav. Channel (µg/kg)	Inside Nav. Channel (µg/kg)
total PCB	75	1,000	350	1,000
total PAH	30,000 (ESD)	170,000	30,000	170,000
DDx	160 (a)	650	578	650
2,3,7,8-TCDD	0.0006 (a)	0.002	0.0011	0.002
1,2,3,7,8-PeCDD	0.0008 (a)	0.003	0.025	0.025 (b)
2,3,4,7,8-PeCDF	0.2 (a)	1	0.35	1

General Notes:

1. Refer to Appendix I for detailed information on selection of target SWACs and updated BRVs.
2. Updated RALs inside the navigation channel remained the same as the ROD RAL.

Footnotes:

a. The ROD RAL curves cover a small area of the site where there was adequate data coverage, then the RAL was applied Site-wide. For the PDI data evaluation, Site-wide RAL curves were developed with the Site-wide 2018 dataset.

b. 1,2,3,7,8-PeCDD navigation channel RAL is different from the ROD navigation channel RAL, as a result of the updated Site-wide RAL being higher than the ROD navigation channel RAL.

Acronyms:

µg/kg = micrograms per kilogram
BRV = bed replacement value
DDx = dichlorodiphenyltrichloroethane and its derivatives
ESD = Explanation of Significant Differences
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
RAL = Remedial Action Level
ROD = Record of Decision
SMA = sediment management area
SWAC = spatially weighted average concentration
TCDD = tetrachlorodibenzo-p-dioxin
UCL = upper confidence limit

Table 2. Data Sources Added to PDI Dataset for Mapping the Refined SMAs

Dataset	Year	Description	Sample Location Count [e]
EPA FS Sediment Database	2016	MSAccess database, downloaded from EPA project website, surface sediment samples down to 40 cm depth; contains pre-filtered data according the FS Appendix A data rules for mapping the remedial boundary and remedial alternatives; includes the GASCO and Arkema EECA data	2879 (2,339 from 2002 onward)
RM 11E	2013/2014	Excel file downloaded from the EPA Data Portal in December 2018. File contained all data for RM10 to RM12, including historic (pre-RI), RI/FS, and post-RI (Supplement RI/FS). Post RI data included data sampled in 2010/2011 and 2013/2014. The 2010/2011 data was included in the EPA FS Sediment Database, only the 2013/2014 data was included from this file. Sediment samples analysed for full RI analytes list, PCB measured as Aroclors	22
Kleinfelder site-wide PCB grab data[a,c]	2014	Excel files, PCB Aroclors only; 125 surface sediment grab samples 0 to 30 cm[a], June 2015 report	98
NewFields RM 5 to 6 sediment core data[b,d]	2014/2015	Excel files, 50 locations[b], analyzed for PCBs, PAHs, DDx, and dioxins/furans, March 2016 report. Surface samples from 0 to 30 cm bml, deeper core interval sampled from -48 to -54 ft. CRD	45 (2014) and 50 (2015)
Geosyntec Swan Island Lagoon grab data[e]	2016	Excel files, 20 surface sediment grab samples 0 to 30 cm, analyzed for PCB Aroclors, TOC, grain size, 2016 Report	20

Footnotes:

a. These samples were actually collected from 0 to 30 cm depth, and the report is incorrect. Personal communication with Kleinfelder PM (Email from Rick Della on 4.28.19).

b. The top interval of the sediment core was 0 to 30 cm depth.

c. Kleinfelder, 2015. Sediment Sampling Data Report, Portland Harbor, Portland, Oregon.

d. NewFields, 2016. Concentrations and Character of PAH in Sediments in the Proposed Remedial Alternatives Area of the Portland Harbor Superfund Site, River Miles 5-6 2015 Investigation. 29 March.

e. Sediment sample locations within the Site only; core sample data was not included in SMA mapping.

Acronyms:

Cat = category; cm = centimeter; COC = chemical of concern; CRD = Columbia River Datum; DDx = dichlorodiphenyltrichloroethane and its derivatives; EPA = United States Environmental Protection Agency; FS = feasibility study; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; PDI = Pre-Remedial Design Investigation; PM = Project Manager; QA = quality assurance; RI = remedial investigation; RM = river mile; ROD = record of decision; SMA = Sediment Management Area; TOC = total organic carbon

Table 3. Replacement of Historical Records Based on Newer Records within 100 Feet

Process	Total Records Omitted from Database	Records Remaining in Database	% of Records Omitted
Number of Replacement Records[a]	0	9,501	0.0%
Replacement of FS Records by Post-FS records within 100 ft[b]	222	9,279	2.3%
Replacement of FS and Post-FS Records by PDI locations within 100 ft[c]	1,847	7,667	19.4%

Notes:

a. A “record” refers to a single COC concentration at a single sample location, where that concentration might represent the average of a duplicate pair.

b. FS samples were replaced if a post-FS sample was located within 100 ft of the FS sample and analyzed for the same analyte.

c. FS and post-FS samples were replaced if a PDI sample was located within 100 ft of the historical sample and analyzed for the same analyte.

Acronyms:

COC = contaminant of concern; FS = feasibility study; ft = feet; PDI = Pre-Remedial Design Investigation

Table 4. Comparison of Refined and ROD SMA Acres and Volumes

Report	SMA (acres)	Volume (cy)
Proposed Plan (a)	290	1,885,000
ROD Alt F Mod (b)	365	3,666,427
ESD Alt F Mod (c)	348	3,622,627
Preliminary Refined SMAs (5-ft depth) (c,d)	320	2,581,000
Refined SMAs (3 focused COCs, 3-ft depth) (d,e)	111	537,000
Refined SMAs (3 focused COCs, 5-ft depth) (d,e)	111	895,000

Footnotes:

a. Proposed Plan values were taken from the EPA Proposed Cleanup Plan Community Fact Sheet (June 2016).

b. ROD SMA and volumes above RALs were taken from the Table D2.d. Page 12. Volumes present the dredge volume and not riverbank excavation or capping. Used ROD RALs.

c. The ROD and ESD RALs (for PAHs) were used for the ESD and the Preliminary Refined SMAs, but the latter used the PDI SMA dataset (which added 2018 and post-FS data from the ROD/FS dataset). The ROD SMAs had a different RAL for PAHs.

d. The Preliminary Refined SMAs and the Refined SMAs were delineated with the same dataset (the PDI SMA mapping dataset); however, the Refined SMAs were drawn with the updated RALs.

e. The volume calculated for the evaluation report SMA footprints were simple calculations to 3-ft and 5-ft below 2018 mudline.

Acronyms:

Alt F Mod = Alternate F Modified

COC = contaminant of concern

cy = cubic yard

EPA = U.S. Environmental Protection Agency

ESD = Explanation of Significant Differences

ft = foot

PAH = polycyclic aromatic hydrocarbons

RAL = Remedial Action Level

ROD = Record of Decision

SMA = sediment management area

Table 5. Post-Construction Site-Wide SWACs for the Focused COCs

Analyte	ROD SWAC (µg/kg)	2018 Pre-Remedy Site-Wide SWAC (µg/kg)	Updated BRV (µg/kg)	Target SWAC (µg/kg)	Estimated Post-Construction SWAC (µg/kg)	
					Refined SMA based on 3 Focused COCs (111 acres)	Refined SMA Based on 6 Focused COCs (143 acres)
total PCB	92	44	9.6	24	26	25
total PAH	36,000	7,710	377	1,980	3,980	3,900
DDx	52	36	2.7	9.6	8.1	7.7
2,3,7,8-TCDD	0.0009	0.00031	0.00014	0.00025	0.00028	0.00025
1,2,3,7,8-PeCDD	0.0005	0.0014	0.00031	0.00049	0.0013	0.00045
2,3,4,7,8-PeCDF	0.017	0.0051	0.00027	0.002	0.0014	0.0013

Notes:

1. ROD SWAC values are from ROD Figures 10 through 15.

2. Current 2018 SWACs were calculated using natural neighbor interpolation. More detail on Site-wide SWAC calculation is provided in Appendix D.2.

3. Post-remedy SWACs were calculated by replacing grid cells located within an SMA footprint with the bed replacement value. Updated bed replacement values are discussed in Appendix I.

4. Pre-construction and post-construction SWACs are based on PDI data only.

5. Selection of target SWACs are discussed in Appendix I.

Acronyms:

µg/kg = micrograms per kilogram

BRV = bed replacement value

COC = contaminant of concern

DDx = dichlorodiphenyltrichloroethane and its derivatives

PAH = polycyclic aromatic hydrocarbons

PCB = polychlorinated biphenyl

PDI = Pre-Remedial Design Investigation

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

ROD = Record of Decision

SMA = sediment management area

SWAC = spatially weighted average concentration

TCDD = tetrachlorodibenzo-p-dioxin

Table 6a. Site COCs Addressed by Refined SMA Footprint (Three Focused COCs)

Analyte	ROD CUL River Bank Soil/Sediment		# of PDI sample locations	PDI Sample Locations with Concentration above ROD CUL			PDI Sample Locations with Concentration above 5x ROD CUL			PDI Sample Locations with Concentration above 10x ROD CUL		
	Unit	Conc.		Total # of locations	# within Refined SMA	% of samples inside SMA[b]	Total # of locations	# within Refined SMA	% of samples inside SMA[b]	Total # of locations	# within Refined SMA	% of samples inside SMA[b]
Aldrin	µg/kg	2	424	0	0	100%	0	0	100%	0	0	100%
Arsenic	mg/kg	3	424	407	20	9%	1	0	99.8%	0	0	100%
Arsenic (a)	mg/kg	4.0	424	348	17	22%	1	0	99.8%	0	0	100%
BEHP	µg/kg	135	424	72	10	85%	13	2	97%	3	0	99.3%
Cadmium	mg/kg	0.51	424	7	2	99%	0	0	100%	0	0	100%
Chlordanes	µg/kg	1.4	424	135	13	71%	7	3	99%	3	3	100%
Copper	mg/kg	359	424	1	0	99.8%	0	0	100%	0	0	100%
DDD	µg/kg	114	655	11	11	100%	2	2	100%	1	1	100%
DDE	µg/kg	226	655	2	2	100%	0	0	100%	0	0	100%
DDT	µg/kg	246	655	6	6	100%	2	2	100%	2	2	100%
Dieldrin	µg/kg	0.07	424	28	4	94%	28	4	94%	11	4	98%
Lindane	µg/kg	5	424	0	0	100%	0	0	100%	0	0	100%
Lead	mg/kg	196	424	0	0	100%	0	0	100%	0	0	100%
Mercury	mg/kg	0.085	424	85	10	82%	3	1	99.5%	1	0	99.8%
1,2,3,4,7,8-HxCDF	µg/kg	0.0004	655	573	54	21%	299	47	62%	174	41	80%
1,2,3,7,8-PeCDD	µg/kg	0.0002	655	403	37	44%	87	18	89%	28	5	96%
1,2,3,7,8-PeCDD (a)	µg/kg	0.00049	655	229	30	70%	20	4	98%	5	1	99%
2,3,4,7,8-PeCDF	µg/kg	0.0003	655	461	52	38%	182	42	79%	111	30	88%
2,3,4,7,8-PeCDF (a)	µg/kg	0.00044	655	350	52	55%	106	30	88%	53	22	95%
2,3,7,8-TCDD	µg/kg	0.0002	655	219	30	71%	21	7	98%	10	1	99%
2,3,7,8-TCDD (a)	µg/kg	0.00025	655	264	32	65%	27	8	97%	11	2	99%
2,3,7,8-TCDF	µg/kg	0.00041	655	531	54	27%	148	34	83%	73	24	93%
TPH-Diesel	mg/kg	91	424	87	14	83%	12	7	99%	6	5	99.8%
Tributyltin	µg/kg	3080	424	2	0	99.5%	0	0	100%	0	0	100%
Zinc	mg/kg	459	424	0	0	100%	0	0	100%	0	0	100%

General Notes:

1. Only 2018 PDI samples were analyzed for PDI CUL exceedances. SMA footprint based on 111-acre three-focused COCs.
2. Values taken from FS Tables 2.2-8 and 2.2-12.
3. This table does not show the three focused COCs (tPCBs, tPAHs, or DDx).

Footnotes:

a. Background-based CUL have been updated based on 95UCL of PDI upstream data. See Appendix F.1.

b. Includes all samples that are captured within the refined SMA or contain a concentration below the CUL exceedance factor.

Acronyms:

- = not applicable
µg/kg = micrograms per kilogram
BEHP = bis(2-ethylhexyl)phthalate
COC = contaminant of concern
Conc. = concentration
CUL = cleanup level
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = dichlorodiphenyltrichloroethane and its derivatives
FS = feasibility study
GIS = geographic information system
HxCDF = hexachlorodibenzofuran
mg/kg = milligram per kilogram
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbon

Table 6b. Site COCs Addressed by Refined SMA Footprint (Six Focused COCs)

Analyte	ROD CUL River Bank Soil/Sediment		# of PDI sample locations	PDI Sample Locations with Concentration above 1x ROD CUL			PDI Sample Locations with Concentration above 5x ROD CUL			PDI Sample Locations with Concentration above 10x ROD CUL		
	Unit	Conc.		Total # of locations	# within Refined SMA	% of samples inside SMA[b]	Total # of locations	# within Refined SMA	% of samples inside SMA[b]	Total # of locations	# within Refined SMA	% of samples inside SMA[b]
Aldrin	µg/kg	2	424	0	0	100%	0	0	100%	0	0	100%
Arsenic	mg/kg	3	424	407	27	10%	1	0	99.8%	0	0	100%
Arsenic (a)	mg/kg	4	424	348	24	24%	1	0	100%	0	0	100%
BEHP	µg/kg	135	424	72	12	86%	13	2	97%	3	0	99%
Cadmium	mg/kg	0.51	424	7	2	99%	0	0	100%	0	0	100%
Chlordanes	µg/kg	1.4	424	135	18	72%	7	4	99%	3	3	100%
Copper	mg/kg	359	424	1	0	100%	0	0	100%	0	0	100%
DDD	µg/kg	114	655	11	11	100%	2	2	100%	1	1	100%
DDE	µg/kg	226	655	2	2	100%	0	0	100%	0	0	100%
DDT	µg/kg	246	655	6	6	100%	2	2	100%	2	2	100%
Dieldrin	µg/kg	0.07	424	28	4	94%	28	4	94%	11	4	98%
Lindane	µg/kg	5	424	0	0	100%	0	0	100%	0	0	100%
Lead	mg/kg	196	424	0	0	100%	0	0	100%	0	0	100%
Mercury	mg/kg	0.085	424	85	13	83%	3	1	99.5%	1	0	99.8%
1,2,3,4,7,8-HxCDF	µg/kg	0.0004	655	573	74	24%	299	61	64%	174	49	81%
2,3,7,8-TCDF	µg/kg	0.00041	655	531	72	30%	148	39	83%	73	26	93%
TPH-Diesel	mg/kg	91	424	87	18	84%	12	7	99%	6	5	99.8%
Tributyltin	µg/kg	3080	424	2	0	99.5%	0	0	100%	0	0	100%
Zinc	mg/kg	459	424	0	0	100%	0	0	100%	0	0	100%

General Notes:

1. Only 2018 PDI samples were analyzed for CUL exceedances. SMA map was based on the merging of the six focused COCs and post-GIS processing.
2. Values taken from FS Tables 2.2-8 and 2.2-12.
3. This table does not show the six focused COCs (PCBs, PAHs, DDx, TCDD, PeCDD, or PeCDF).

Footnotes:

a. Arsenic background-based CUL has been updated to 4 mg/kg based on 95 UCL of PDI upstream data.

b. Includes all samples that are captured within the refined SMA or contain a concentration below the CUL exceedance factor.

Acronyms:

- = not applicable
µg/kg = micrograms per kilogram
BEHP = bis(2-ethylhexyl)phthalate
Conc. = concentration
CUL = cleanup level
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
FS = feasibility study
GIS = geographic information system
HxCDF = hexachlorodibenzofuran
mg/kg = milligram per kilogram
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PDI = Pre-Remedial Design Investigation
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
R = Risk-based number
RAO = Remedial action objectives
ROD = Record of Decision
SMA = sediment management area
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
TPH = total petroleum hydrocarbons
UCL = upper confidence limit

Table 7. Pre- and Post-Construction (Time 0) Nearshore Sediment Site-Wide Cancer Risks and Noncancer Hazards
Direct Contact RAO 1 - Tribal Fisher

Analyte	Current 2018 Pre-Remedy Nearshore Sediment		Estimated Time 0 Post-Construction Nearshore Sediment					
	SWAC Excluding Navigation Channel (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (a) Three Focused COCs (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	Cancer Risk Reduction	SWAC (b) Six Focused COCs (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	Cancer Risk Reduction
Total PCBs	78.4	4.65E-08	39.2	2.32E-08	50%	36.7	2.18E-08	53%
BaP-TEQ	490	1.39E-07	234	6.62E-08	52%	217	6.15E-08	56%
DDx	71.7	3.68E-09	12.4	6.36E-10	83%	11.6	5.95E-10	84%
2,3,7,8-TCDD	0.000406	7.97E-09	0.000358	7.03E-09	12%	0.000284	5.57E-09	30%
1,2,3,7,8-PeCDD	0.00254	4.99E-08	0.00242	4.75E-08	5%	0.00061	1.20E-08	76%
2,3,4,7,8-PeCDF	0.0103	9.78E-08	0.0025	2.34E-08	76%	0.0022	2.10E-08	79%
Total		**3.45E-07**		**1.68E-07**	**51%**		**1.22E-07**	**64%**

Analyte	Current 2018 Pre-Remedy Nearshore Sediment		Estimated Time 0 Post-Construction Nearshore Sediment					
	SWAC Excluding Navigation Channel (µg/kg)	Direct Contact Noncancer HI Tribal Fisher	SWAC (a) Three Focused COCs (µg/kg)	Direct Contact Noncancer HI Tribal Fisher	Noncancer HI Reduction	SWAC (b) Six Focused COCs (µg/kg)	Direct Contact Noncancer HI Tribal Fisher	Noncancer HI Reduction
Total PCBs	78.4	1.16E-03	39.2	5.81E-04	50%	36.7	5.44E-04	53%
BaP-TEQ	490	4.62E-04	234	2.21E-04	52%	217	2.05E-04	56%
DDx	71.7	2.16E-05	12.4	3.74E-06	83%	11.6	3.50E-06	84%
2,3,7,8-TCDD	0.000406	8.76E-05	0.000358	7.72E-05	12%	0.000284	6.13E-05	30%
1,2,3,7,8-PeCDD	0.00254	5.48E-04	0.00242	5.22E-04	5%	0.00061	1.31E-04	76%
2,3,4,7,8-PeCDF	0.0103	6.04E-03	0.0025	1.44E-03	76%	0.0022	1.30E-03	79%
Total		**8.32E-03**		**2.85E-03**	**66%**		**2.24E-03**	**73%**

General Notes:

1. Current 2018 nearshore sediment SWACs (excluding the navigation channel and including SIL) from RM 1.9 up to RM 11.8, both sides of river, were calculated using PDI SRS and SMA data and Natural Neighbor interpolation.

2. Post-construction SWACs were calculated by replacing Site data located within an SMA footprint with the associated bed replacement value, as discussed in Appendix I.

3. BaP-TEQ SWACs were calculated from total PAH SWACs using regression equation presented in the Feasibility Study (Appendix D, Section D5) (EPA 2016c).

Footnotes:

a. Nearshore SWACs were calculated from Refined SMA footprint based on PDI SRS and SMA data for three focused COCs (PCBs, DDx, and total PAHs).

b. Nearshore SWACs were calculated from Refined SMA footprint based on PDI SRS and SMA data for all six focused COCs (PCBs, DDx, total PAHs, TCDD, PeCDD, and PeCDF).

Acronyms:

µg/kg = micrograms per kilogram
BaP-TEQ = benzo(a)pyrene toxicity equivalence
COC = contaminant of concern
DDx = dichlorodiphenyltrichloroethane and its derivatives
EPA = U.S. Environmental Protection Agency
HI = hazard index
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
RAO = remedial action objective
RM = river mile
ROD = Record of Decision
SIL = Swan Island Lagoon
SMA = sediment management area
SRS = stratified random sampling
SWAC = spatially weighted average concentration
TCDD = tetrachlorodibenzo-p-dioxin

Table 8a. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on PCBs, DDx, and total PAHs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 1.9 to 3 East		Nearshore Sediment River Mile 1.9 to 3 West		Nearshore Sediment River Mile 3 to 4 East		Nearshore Sediment River Mile 3 to 4 West		Nearshore Sediment River Mile 4 to 5 East		Nearshore Sediment River Mile 4 to 5 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	40	2.39E-08	6	3.58E-09	37	2.21E-08	14	8.39E-09	24	1.41E-08	16	9.27E-09
BaP-TEQ	156	4.41E-08	152	4.29E-08	189	5.35E-08	385	1.09E-07	418	1.18E-07	758	2.15E-07
DDx	5.1	2.60E-10	4.0	2.07E-10	4.6	2.36E-10	6.9	3.56E-10	5.3	2.73E-10	18.4	9.45E-10
2,3,7,8-TCDD	0.00019	3.64E-09	0.00012	2.27E-09	0.00016	3.14E-09	0.00022	4.36E-09	0.00042	8.20E-09	0.00036	7.10E-09
1,2,3,7,8-PeCDD	0.00049	9.60E-09	0.00027	5.22E-09	0.00052	1.01E-08	0.00121	2.37E-08	0.00360	7.07E-08	0.00115	2.25E-08
2,3,4,7,8-PeCDF	0.00034	3.18E-09	0.00019	1.79E-09	0.00033	3.14E-09	0.00024	2.31E-09	0.00057	5.40E-09	0.00041	3.89E-09
Total		**8.47E-08**		**5.60E-08**		**9.22E-08**		**1.48E-07**		**2.17E-07**		**2.58E-07**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 1.9 to 3 East		Nearshore Sediment River Mile 1.9 to 3 West		Nearshore Sediment River Mile 3 to 4 East		Nearshore Sediment River Mile 3 to 4 West		Nearshore Sediment River Mile 4 to 5 East		Nearshore Sediment River Mile 4 to 5 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	40	5.97E-04	6	8.95E-05	37	5.52E-04	14	2.10E-04	24	3.52E-04	16	2.32E-04
BaP-TEQ	156	1.47E-04	152	1.43E-04	189	1.78E-04	385	3.63E-04	418	3.94E-04	758	7.15E-04
DDx	5.1	1.53E-06	4.0	1.22E-06	4.6	1.39E-06	6.9	2.10E-06	5.3	1.61E-06	18.4	5.56E-06
2,3,7,8-TCDD	0.00019	4.00E-05	0.00012	2.49E-05	0.00016	3.45E-05	0.00022	4.79E-05	0.00042	9.01E-05	0.00036	7.80E-05
1,2,3,7,8-PeCDD	0.00049	1.05E-04	0.00027	5.74E-05	0.00052	1.11E-04	0.00121	2.61E-04	0.00360	7.77E-04	0.00115	2.47E-04
2,3,4,7,8-PeCDF	0.00034	1.97E-04	0.00019	1.11E-04	0.00033	1.94E-04	0.00024	1.42E-04	0.00057	3.34E-04	0.00041	2.40E-04
Total		**1.09E-03**		**4.27E-04**		**1.07E-03**		**1.03E-03**		**1.95E-03**		**1.52E-03**

Notes are presented on the last page.

Table 8a. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on PCBs, DDx, and total PAHs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 5 to 6 East		Nearshore Sediment River Mile 5 to 6 West		Nearshore Sediment River Mile 6 to 7 East		Nearshore Sediment River Mile 6 to 7 West		Nearshore Sediment River Mile 7 to 8 East		Nearshore Sediment River Mile 7 to 8 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	52	3.09E-08	9	5.61E-09	48	2.86E-08	16	9.61E-09	30	1.77E-08	19	1.12E-08
BaP-TEQ	427	1.21E-07	419	1.19E-07	386	1.09E-07	472	1.34E-07	238	6.73E-08	91	2.58E-08
DDx	7.7	3.96E-10	11.6	5.98E-10	12.1	6.19E-10	42.1	2.16E-09	5.5	2.82E-10	77.4	3.97E-09
2,3,7,8-TCDD	0.00049	9.60E-09	0.00023	4.55E-09	0.00076	1.50E-08	0.00025	4.92E-09	0.00047	9.22E-09	0.00027	5.23E-09
1,2,3,7,8-PeCDD	0.00079	1.55E-08	0.00181	3.56E-08	0.00264	5.19E-08	0.00555	1.09E-07	0.00163	3.19E-08	0.02354	4.62E-07
2,3,4,7,8-PeCDF	0.00073	6.96E-09	0.00045	4.26E-09	0.02403	2.28E-07	0.00042	3.99E-09	0.00130	1.23E-08	0.00047	4.49E-09
Total		**1.84E-07**		**1.69E-07**		**4.34E-07**		**2.63E-07**		**1.39E-07**		**5.13E-07**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 5 to 6 East		Nearshore Sediment River Mile 5 to 6 West		Nearshore Sediment River Mile 6 to 7 East		Nearshore Sediment River Mile 6 to 7 West		Nearshore Sediment River Mile 7 to 8 East		Nearshore Sediment River Mile 7 to 8 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	52	7.72E-04	9	1.40E-04	48	7.16E-04	16	2.40E-04	30	4.44E-04	19	2.80E-04
BaP-TEQ	427	4.03E-04	419	3.96E-04	386	3.65E-04	472	4.46E-04	238	2.24E-04	91	8.60E-05
DDx	7.7	2.33E-06	11.6	3.51E-06	12.1	3.64E-06	42.1	1.27E-05	5.5	1.66E-06	77.4	2.34E-05
2,3,7,8-TCDD	0.00049	1.05E-04	0.00023	5.00E-05	0.00076	1.65E-04	0.00025	5.41E-05	0.00047	1.01E-04	0.00027	5.75E-05
1,2,3,7,8-PeCDD	0.00079	1.70E-04	0.00181	3.91E-04	0.00264	5.70E-04	0.00555	1.20E-03	0.00163	3.50E-04	0.02354	5.08E-03
2,3,4,7,8-PeCDF	0.00073	4.30E-04	0.00045	2.63E-04	0.02403	1.41E-02	0.00042	2.46E-04	0.00130	7.60E-04	0.00047	2.77E-04
Total		**1.88E-03**		**1.24E-03**		**1.59E-02**		**2.20E-03**		**1.88E-03**		**5.80E-03**

Notes are presented on the last page.

Table 8a. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on PCBs, DDx, and total PAHs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 8 to 9 East		Nearshore Sediment River Mile 8 to 9 West		Nearshore Sediment River Mile 9 to 10 East		Nearshore Sediment River Mile 9 to 10 West		Nearshore Sediment River Mile 10 to 11 East		Nearshore Sediment River Mile 10 to 11 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	19	1.14E-08	61	3.62E-08	21	1.24E-08	17	1.01E-08	24	1.39E-08	12	7.11E-09
BaP-TEQ	43	1.21E-08	94	2.67E-08	46	1.31E-08	69	1.95E-08	58	1.64E-08	98	2.77E-08
DDx	4.2	2.15E-10	27.3	1.40E-09	2.4	1.26E-10	4.4	2.25E-10	3.3	1.71E-10	11.0	5.67E-10
2,3,7,8-TCDD	0.00020	3.84E-09	0.00069	1.35E-08	0.00019	3.65E-09	0.00037	7.22E-09	0.00026	5.08E-09	0.00035	6.82E-09
1,2,3,7,8-PeCDD	0.00028	5.50E-09	0.00074	1.46E-08	0.00028	5.59E-09	0.00033	6.57E-09	0.00036	7.09E-09	0.00043	8.39E-09
2,3,4,7,8-PeCDF	0.00032	3.08E-09	0.00068	6.44E-09	0.00031	2.93E-09	0.00040	3.83E-09	0.00055	5.27E-09	0.00051	4.86E-09
Total		**3.62E-08**		**9.87E-08**		**3.78E-08**		**4.74E-08**		**4.79E-08**		**5.55E-08**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 8 to 9 East		Nearshore Sediment River Mile 8 to 9 West		Nearshore Sediment River Mile 9 to 10 East		Nearshore Sediment River Mile 9 to 10 West		Nearshore Sediment River Mile 10 to 11 East		Nearshore Sediment River Mile 10 to 11 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	19	2.84E-04	61	9.04E-04	21	3.10E-04	17	2.54E-04	24	3.48E-04	12	1.78E-04
BaP-TEQ	43	4.05E-05	94	8.88E-05	46	4.38E-05	69	6.48E-05	58	5.45E-05	98	9.24E-05
DDx	4.2	1.27E-06	27.3	8.25E-06	2.4	7.39E-07	4.4	1.32E-06	3.3	1.00E-06	11.0	3.33E-06
2,3,7,8-TCDD	0.00020	4.22E-05	0.00069	1.48E-04	0.00019	4.02E-05	0.00037	7.93E-05	0.00026	5.58E-05	0.00035	7.50E-05
1,2,3,7,8-PeCDD	0.00028	6.05E-05	0.00074	1.60E-04	0.00028	6.14E-05	0.00033	7.22E-05	0.00036	7.79E-05	0.00043	9.22E-05
2,3,4,7,8-PeCDF	0.00032	1.90E-04	0.00068	3.98E-04	0.00031	1.81E-04	0.00040	2.37E-04	0.00055	3.26E-04	0.00051	3.00E-04
Total		**6.19E-04**		**1.71E-03**		**6.37E-04**		**7.08E-04**		**8.63E-04**		**7.41E-04**

Notes are presented on the last page.

Table 8a. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on PCBs, DDx, and total PAHs)

Analyte	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher					
	Nearshore Sediment River Mile 11 to 11.8 East		Nearshore Sediment River Mile 11 to 11.8 West		Swan Island Lagoon	
	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	110	6.52E-08	4	2.11E-09	111	6.57E-08
BaP-TEQ	52	1.46E-08	31	8.83E-09	187	5.29E-08
DDx	3.0	1.54E-10	3.2	1.63E-10	7.1	3.64E-10
2,3,7,8-TCDD	0.00022	4.40E-09	0.00027	5.34E-09	0.00055	1.08E-08
1,2,3,7,8-PeCDD	0.00029	5.64E-09	0.00020	3.98E-09	0.00135	2.66E-08
2,3,4,7,8-PeCDF	0.00037	3.53E-09	0.00030	2.84E-09	0.00113	1.07E-08
Total		**9.36E-08**		**2.33E-08**		**1.67E-07**

Analyte	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher					
	Nearshore Sediment River Mile 11 to 11.8 East		Nearshore Sediment River Mile 11 to 11.8 West		Swan Island Lagoon	
	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	110	1.63E-03	4	5.28E-05	111	1.64E-03
BaP-TEQ	52	4.88E-05	31	2.94E-05	187	1.76E-04
DDx	3.0	9.03E-07	3.2	9.60E-07	7.1	2.14E-06
2,3,7,8-TCDD	0.00022	4.84E-05	0.00027	5.87E-05	0.00055	1.18E-04
1,2,3,7,8-PeCDD	0.00029	6.20E-05	0.00020	4.37E-05	0.00135	2.92E-04
2,3,4,7,8-PeCDF	0.00037	2.18E-04	0.00030	1.76E-04	0.00113	6.63E-04
Total		**2.01E-03**		**3.61E-04**		**2.89E-03**

Notes are presented on the last page.

Table 8a. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on PCBs, DDx, and total PAHs)

Notes:

1. Current 2018 SWACs were calculated using PDI SRS and SMA data and Natural Neighbor interpolation. More detail discussing the calculation of SWACs is provided in Appendix D.2.
2. Post-construction SWACs were calculated by replacing Site data located within an SMA footprint with the associated bed replacement value, as discussed in Appendix I.
3. BaP-TEQ SWACs were calculated from total PAH SWACs using regression equation presented in the Feasibility Study (Appendix D, Section D5) (EPA 2016c).
4. SWACs were calculated from Refined SMA footprint based on PDI SRS and SMA data for three focused COCs (PCBs, DDx, and total PAHs only).

Acronyms:

µg/kg = micrograms per kilogram
BaP-TEQ = benzo(a)pyrene toxicity equivalence
DDx = dichlorodiphenyltrichloroethane and its derivatives
EPA = U.S. Environmental Protection Agency
HI = hazard index
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
RAO = remedial action objective
ROD = Record of Decision
SMA = sediment management area
SRS = stratified random sampling
SWAC = spatially weighted average concentration
TCDD = tetrachlorodibenzo-p-dioxin

Table 8b. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on All Focused COCs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 1.9 to 3 East		Nearshore Sediment River Mile 1.9 to 3 West		Nearshore Sediment River Mile 3 to 4 East		Nearshore Sediment River Mile 3 to 4 West		Nearshore Sediment River Mile 4 to 5 East		Nearshore Sediment River Mile 4 to 5 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	40	2.39E-08	6	3.58E-09	37	2.21E-08	14	8.39E-09	23	1.37E-08	16	9.26E-09
BaP-TEQ	156	4.41E-08	152	4.29E-08	189	5.35E-08	385	1.09E-07	391	1.11E-07	749	2.12E-07
DDx	5.1	2.60E-10	4.0	2.07E-10	4.6	2.36E-10	6.9	3.56E-10	5.2	2.68E-10	18.2	9.36E-10
2,3,7,8-TCDD	0.00019	3.64E-09	0.00012	2.27E-09	0.00016	3.14E-09	0.00022	4.36E-09	0.00038	7.44E-09	0.00028	5.48E-09
1,2,3,7,8-PeCDD	0.00049	9.60E-09	0.00027	5.22E-09	0.00052	1.01E-08	0.00121	2.37E-08	0.00333	6.53E-08	0.00111	2.17E-08
2,3,4,7,8-PeCDF	0.00034	3.18E-09	0.00019	1.79E-09	0.00033	3.14E-09	0.00024	2.31E-09	0.00054	5.12E-09	0.00039	3.74E-09
Total		**8.47E-08**		**5.60E-08**		**9.22E-08**		**1.48E-07**		**2.03E-07**		**2.53E-07**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 1.9 to 3 East		Nearshore Sediment River Mile 1.9 to 3 West		Nearshore Sediment River Mile 3 to 4 East		Nearshore Sediment River Mile 3 to 4 West		Nearshore Sediment River Mile 4 to 5 East		Nearshore Sediment River Mile 4 to 5 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	40	5.97E-04	6	8.95E-05	37	5.52E-04	14	2.10E-04	23	3.42E-04	16	2.31E-04
BaP-TEQ	156	1.47E-04	152	1.43E-04	189	1.78E-04	385	3.63E-04	391	3.69E-04	749	7.07E-04
DDx	5.1	1.53E-06	4.0	1.22E-06	4.6	1.39E-06	6.9	2.10E-06	5.2	1.58E-06	18.2	5.51E-06
2,3,7,8-TCDD	0.00019	4.00E-05	0.00012	2.49E-05	0.00016	3.45E-05	0.00022	4.79E-05	0.00038	8.17E-05	0.00028	6.02E-05
1,2,3,7,8-PeCDD	0.00049	1.05E-04	0.00027	5.74E-05	0.00052	1.11E-04	0.00121	2.61E-04	0.00333	7.18E-04	0.00111	2.39E-04
2,3,4,7,8-PeCDF	0.00034	1.97E-04	0.00019	1.11E-04	0.00033	1.94E-04	0.00024	1.42E-04	0.00054	3.16E-04	0.00039	2.31E-04
Total		**1.09E-03**		**4.27E-04**		**1.07E-03**		**1.03E-03**		**1.83E-03**		**1.47E-03**

Notes are presented on the last page.

Table 8b. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on All Focused COCs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 5 to 6 East		Nearshore Sediment River Mile 5 to 6 West		Nearshore Sediment River Mile 6 to 7 East		Nearshore Sediment River Mile 6 to 7 West		Nearshore Sediment River Mile 7 to 8 East		Nearshore Sediment River Mile 7 to 8 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	44	2.61E-08	9	5.61E-09	38	2.26E-08	15	8.95E-09	26	1.54E-08	19	1.11E-08
BaP-TEQ	335	9.47E-08	419	1.19E-07	281	7.95E-08	460	1.30E-07	212	6.00E-08	91	2.56E-08
DDx	6.7	3.42E-10	11.6	5.98E-10	11.3	5.78E-10	38.4	1.97E-09	5.1	2.64E-10	69.6	3.57E-09
2,3,7,8-TCDD	0.00031	6.15E-09	0.00023	4.55E-09	0.00029	5.71E-09	0.00024	4.76E-09	0.00039	7.59E-09	0.00027	5.20E-09
1,2,3,7,8-PeCDD	0.00071	1.39E-08	0.00181	3.56E-08	0.00195	3.83E-08	0.00527	1.04E-07	0.00125	2.46E-08	0.02094	4.11E-07
2,3,4,7,8-PeCDF	0.00067	6.33E-09	0.00045	4.26E-09	0.00159	1.51E-08	0.00041	3.94E-09	0.00101	9.57E-09	0.00047	4.46E-09
Total		**1.48E-07**		**1.69E-07**		**1.62E-07**		**2.54E-07**		**1.17E-07**		**4.61E-07**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 5 to 6 East		Nearshore Sediment River Mile 5 to 6 West		Nearshore Sediment River Mile 6 to 7 East		Nearshore Sediment River Mile 6 to 7 West		Nearshore Sediment River Mile 7 to 8 East		Nearshore Sediment River Mile 7 to 8 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	44	6.51E-04	9	1.40E-04	38	5.66E-04	15	2.24E-04	26	3.84E-04	19	2.77E-04
BaP-TEQ	335	3.16E-04	419	3.96E-04	281	2.65E-04	460	4.35E-04	212	2.00E-04	91	8.55E-05
DDx	6.7	2.01E-06	11.6	3.51E-06	11.3	3.40E-06	38.4	1.16E-05	5.1	1.55E-06	69.6	2.10E-05
2,3,7,8-TCDD	0.00031	6.76E-05	0.00023	5.00E-05	0.00029	6.28E-05	0.00024	5.24E-05	0.00039	8.34E-05	0.00027	5.72E-05
1,2,3,7,8-PeCDD	0.00071	1.53E-04	0.00181	3.91E-04	0.00195	4.20E-04	0.00527	1.14E-03	0.00125	2.70E-04	0.02094	4.52E-03
2,3,4,7,8-PeCDF	0.00067	3.91E-04	0.00045	2.63E-04	0.00159	9.34E-04	0.00041	2.43E-04	0.00101	5.91E-04	0.00047	2.75E-04
Total		**1.58E-03**		**1.24E-03**		**2.25E-03**		**2.10E-03**		**1.53E-03**		**5.23E-03**

Notes are presented on the last page.

Table 8b. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on All Focused COCs)

	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher											
	Nearshore Sediment River Mile 8 to 9 East		Nearshore Sediment River Mile 8 to 9 West		Nearshore Sediment River Mile 9 to 10 East		Nearshore Sediment River Mile 9 to 10 West		Nearshore Sediment River Mile 10 to 11 East		Nearshore Sediment River Mile 10 to 11 West	
Analyte	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	19	1.14E-08	59	3.48E-08	21	1.24E-08	17	1.02E-08	24	1.39E-08	12	6.88E-09
BaP-TEQ	43	1.21E-08	91	2.58E-08	46	1.31E-08	69	1.94E-08	58	1.64E-08	99	2.79E-08
DDx	4.2	2.15E-10	26.5	1.36E-09	2.4	1.26E-10	4.3	2.22E-10	3.3	1.71E-10	11.0	5.63E-10
2,3,7,8-TCDD	0.00020	3.84E-09	0.00042	8.25E-09	0.00019	3.65E-09	0.00030	5.98E-09	0.00026	5.08E-09	0.00025	4.97E-09
1,2,3,7,8-PeCDD	0.00028	5.50E-09	0.00071	1.39E-08	0.00028	5.59E-09	0.00033	6.52E-09	0.00036	7.09E-09	0.00043	8.35E-09
2,3,4,7,8-PeCDF	0.00032	3.08E-09	0.00063	5.99E-09	0.00031	2.93E-09	0.00040	3.79E-09	0.00055	5.27E-09	0.00050	4.78E-09
Total		**3.62E-08**		**9.01E-08**		**3.78E-08**		**4.61E-08**		**4.79E-08**		**5.35E-08**

	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher											
	Nearshore Sediment River Mile 8 to 9 East		Nearshore Sediment River Mile 8 to 9 West		Nearshore Sediment River Mile 9 to 10 East		Nearshore Sediment River Mile 9 to 10 West		Nearshore Sediment River Mile 10 to 11 East		Nearshore Sediment River Mile 10 to 11 West	
Analyte	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	19	2.84E-04	59	8.69E-04	21	3.10E-04	17	2.54E-04	24	3.48E-04	12	1.72E-04
BaP-TEQ	43	4.05E-05	91	8.60E-05	46	4.38E-05	69	6.48E-05	58	5.45E-05	99	9.30E-05
DDx	4.2	1.27E-06	26.5	8.02E-06	2.4	7.39E-07	4.3	1.31E-06	3.3	1.00E-06	11.0	3.31E-06
2,3,7,8-TCDD	0.00020	4.22E-05	0.00042	9.07E-05	0.00019	4.02E-05	0.00030	6.57E-05	0.00026	5.58E-05	0.00025	5.47E-05
1,2,3,7,8-PeCDD	0.00028	6.05E-05	0.00071	1.53E-04	0.00028	6.14E-05	0.00033	7.17E-05	0.00036	7.79E-05	0.00043	9.18E-05
2,3,4,7,8-PeCDF	0.00032	1.90E-04	0.00063	3.70E-04	0.00031	1.81E-04	0.00040	2.34E-04	0.00055	3.26E-04	0.00050	2.96E-04
Total		**6.19E-04**		**1.58E-03**		**6.37E-04**		**6.91E-04**		**8.63E-04**		**7.10E-04**

Notes are presented on the last page.

Table 8b. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on All Focused COCs)

Analyte	Post-Construction River Mile SWACs and Cancer Risks - Tribal Fisher					
	Nearshore Sediment River Mile 11 to 11.8 East		Nearshore Sediment River Mile 11 to 11.8 West		Swan Island Lagoon	
	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher	SWAC (µg/kg)	Direct Contact Cancer Risk Tribal Fisher
Total PCBs	110	6.52E-08	4	2.11E-09	104	6.14E-08
BaP-TEQ	52	1.46E-08	31	8.83E-09	176	4.97E-08
DDx	3.0	1.54E-10	3.2	1.63E-10	6.4	3.31E-10
2,3,7,8-TCDD	0.00022	4.40E-09	0.00027	5.34E-09	0.00051	9.98E-09
1,2,3,7,8-PeCDD	0.00029	5.64E-09	0.00020	3.98E-09	0.00132	2.58E-08
2,3,4,7,8-PeCDF	0.00037	3.53E-09	0.00030	2.84E-09	0.00109	1.04E-08
Total		**9.36E-08**		**2.33E-08**		**1.58E-07**

Analyte	Post-Construction River Mile SWACs and Noncancer Hazards - Tribal Fisher					
	Nearshore Sediment River Mile 11 to 11.8 East		Nearshore Sediment River Mile 11 to 11.8 West		Swan Island Lagoon	
	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher	SWAC (µg/kg)	Direct Contact HI Tribal Fisher
Total PCBs	110	1.63E-03	4	5.28E-05	104	1.54E-03
BaP-TEQ	52	4.88E-05	31	2.94E-05	176	1.66E-04
DDx	3.0	9.03E-07	3.2	9.60E-07	6.4	1.94E-06
2,3,7,8-TCDD	0.00022	4.84E-05	0.00027	5.87E-05	0.00051	1.10E-04
1,2,3,7,8-PeCDD	0.00029	6.20E-05	0.00020	4.37E-05	0.00132	2.84E-04
2,3,4,7,8-PeCDF	0.00037	2.18E-04	0.00030	1.76E-04	0.00109	6.40E-04
Total		**2.01E-03**		**3.61E-04**		**2.74E-03**

Notes are presented on the last page.

Table 8b. Post-Construction (Time 0) Nearshore Sediment River Mile Cancer Risks and Noncancer Hazards - Direct Contact RAO 1 - Tribal Fisher (SMA Footprint Based on All Focused COCs)

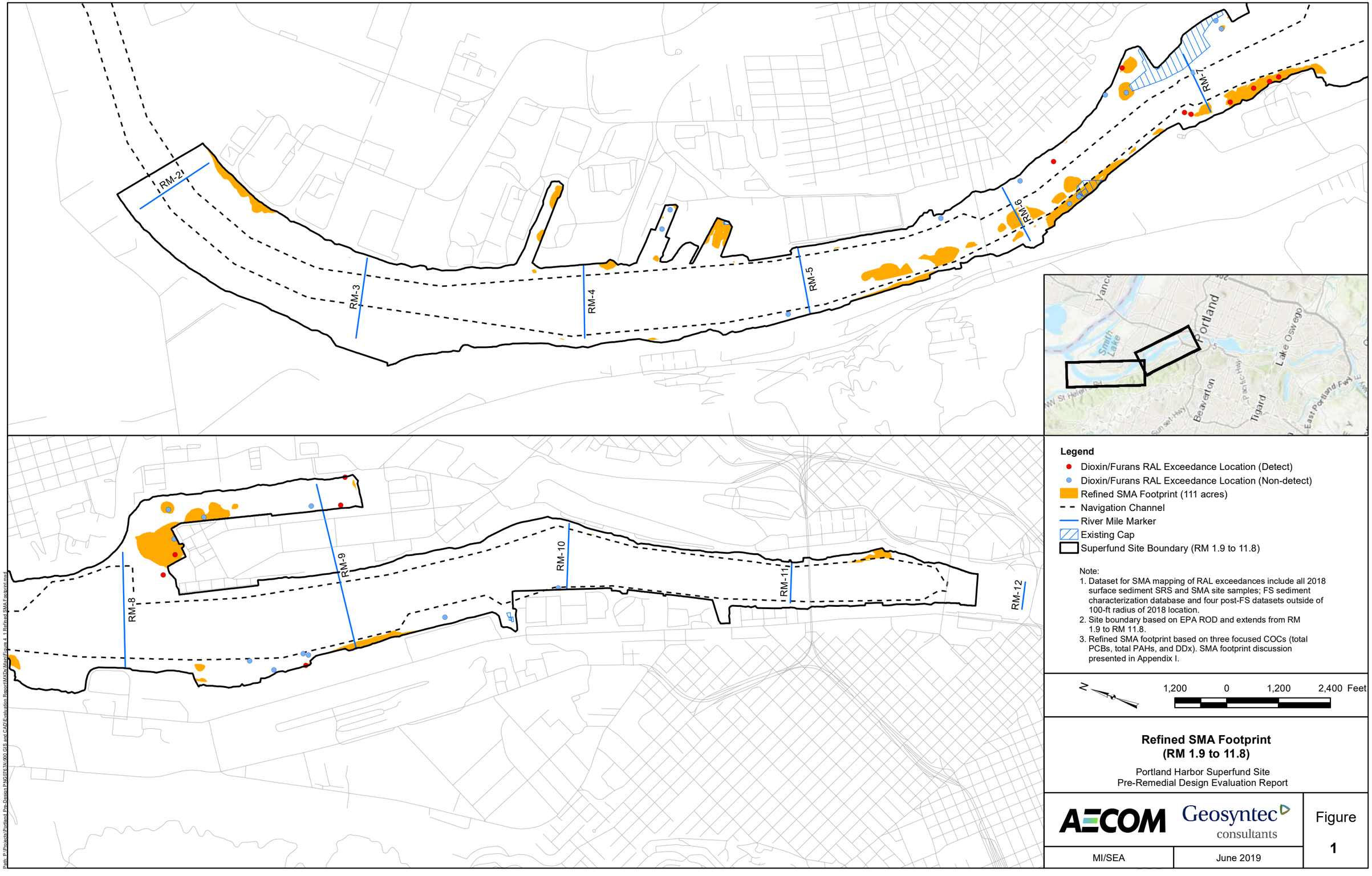
Notes:

1. Current 2018 SWACs were calculated using PDI SRS and SMA data and Natural Neighbor interpolation. More detail discussing the calculation of SWACs is provided in Appendix D.2.
2. Post-construction SWACs were calculated by replacing Site data located within an SMA footprint with the associated bed replacement value, as discussed in Appendix I.
3. BaP-TEQ SWACs were calculated from total PAH SWACs using regression equation presented in the Feasibility Study (Appendix D, Section D5) (EPA 2016c).
4. SWACs were calculated from Refined SMA footprint based on PDI SRS and SMA data for all six focused COCs (PCBs, DDx, total PAHs, TCDD, PeCDD, and PeCDF).

Acronyms:

µg/kg = micrograms per kilogram
BaP-TEQ = benzo(a)pyrene toxicity equivalence
DDx = dichlorodiphenyltrichloroethane and its derivatives
EPA = U.S. Environmental Protection Agency
HI = hazard index
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
RAO = remedial action objective
ROD = Record of Decision
SMA = sediment management area
SRS = stratified random sampling
SWAC = spatially weighted average concentration
TCDD = tetrachlorodibenzo-p-dioxin

FIGURES



Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- Refined SMA Footprint (111 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

Note:
1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
3. Refined SMA footprint based on three focused COCs (total PCBs, total PAHs, and DDx). SMA footprint discussion presented in Appendix I.

N

1,200 0 1,200 2,400 Feet

Refined SMA Footprint (RM 1.9 to 11.8)

Portland Harbor Superfund Site
Pre-Remedial Design Evaluation Report

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Figure	
1	
MI/SEA	June 2019

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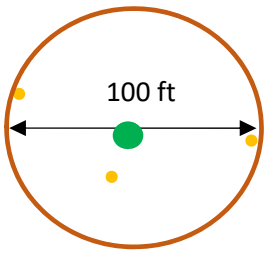
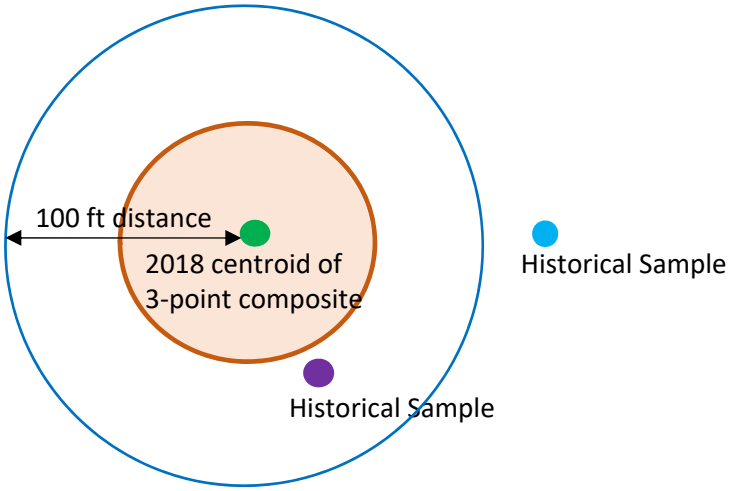


● = Example of 2018 PDI centroid location of 3-point surface sediment composite

● = 2018 surface sediment locations

Note:
Surface Sediment Field Sampling Report (Appendix A) provides details for determination of the x/y centroid locations of 3-point composite samples generally collected within a 50-ft radius of target.



● = Example of 2018 PDI centroid location of 3-point surface sediment composite

● = Example of historical sample replaced (within 100 ft)

● = Example of historical sample retained (outside 100 ft)

◯ = Approximate area of composite sample

Note:
Historical data were replaced with newer data if the samples were within 100 ft and analyzed for the same focused contaminant of concern. The replacement was used to represent current sediment concentrations.

Diagram of 100-ft Data Replacement
Portland Harbor Superfund Site
Pre-Remedial Design Evaluation Report

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Figure 2

MI/SEA | June 2019

Path: P:\Projects\Portland Pre-Design PNG07267A\900 GIS and CAD\Appendix G Figures\MXDs\Figure G-2_Diagram of 100ft buffer.mxd

Legend

total PCBs (SMA Mapping Dataset) - Natural Neighbor

- ≤ PDI CUL (20.4 µg/kg)
- > PDI CUL and ≤ PDI RAL (350 µg/kg)
- > PDI RAL and ≤ PDI Nav RAL (1,000 µg/kg)
- > PDI Nav RAL (1,000 µg/kg)
- 2018 PDI Surface Sediment Sample Location
- Historical Surface Sediment Sample Location
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

1,200 600 0 1,200 2,400 Feet

Notes:

1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

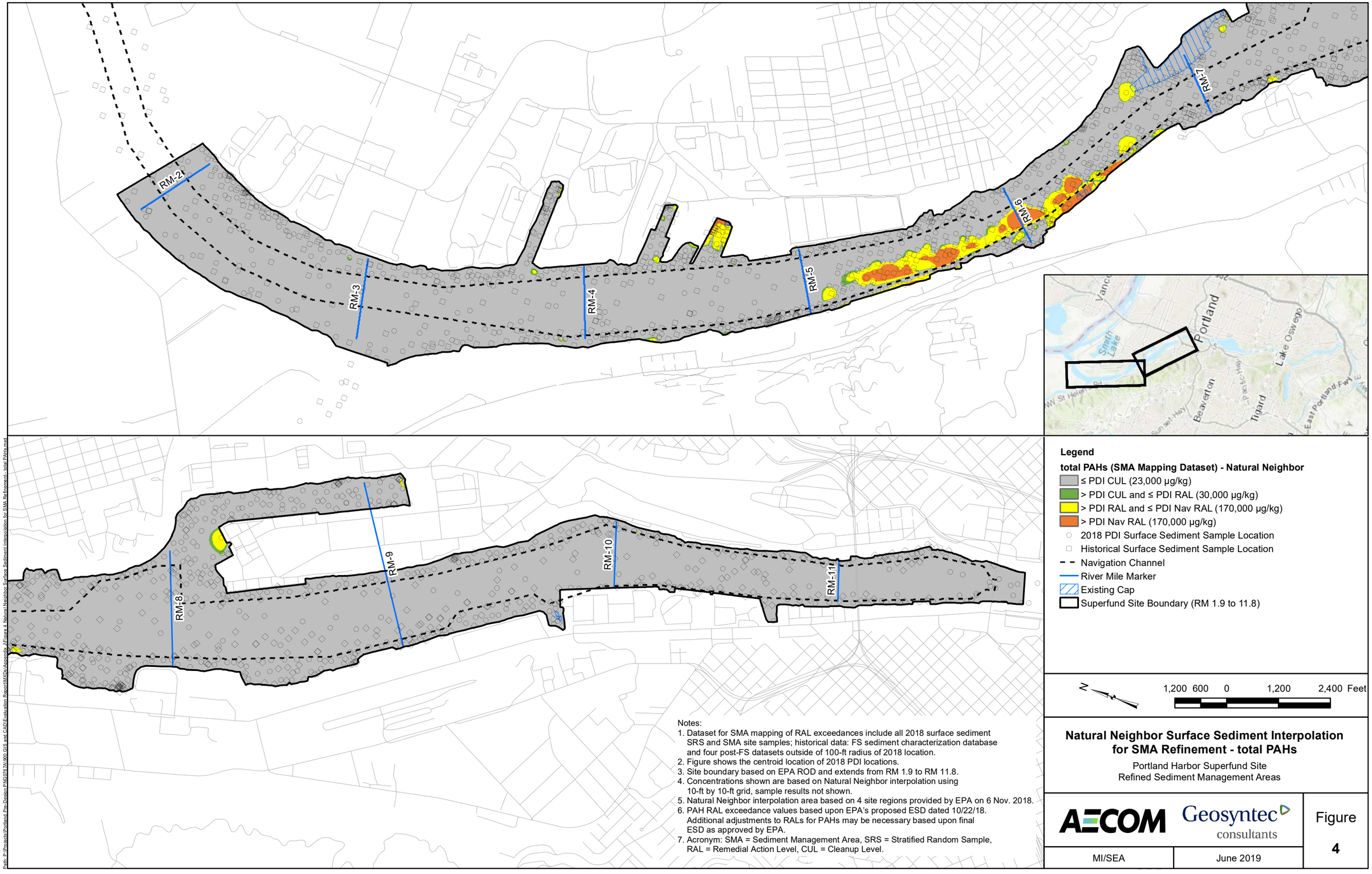
Natural Neighbor Surface Sediment Interpolation for SMA Refinement - total PCBs

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 3

Path: P:\Projects\Portland Pre-Design PKG\0767\A900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 3 Natural Neighbor Surface Sediment Interpolation for SMA Refinement - total PCBs.mxd



Notes:
1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. PAH RAL exceedance values based upon EPA's proposed ESD dated 10/22/18. Additional adjustments to RALs for PAHs may be necessary based upon final ESD as approved by EPA.
7. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

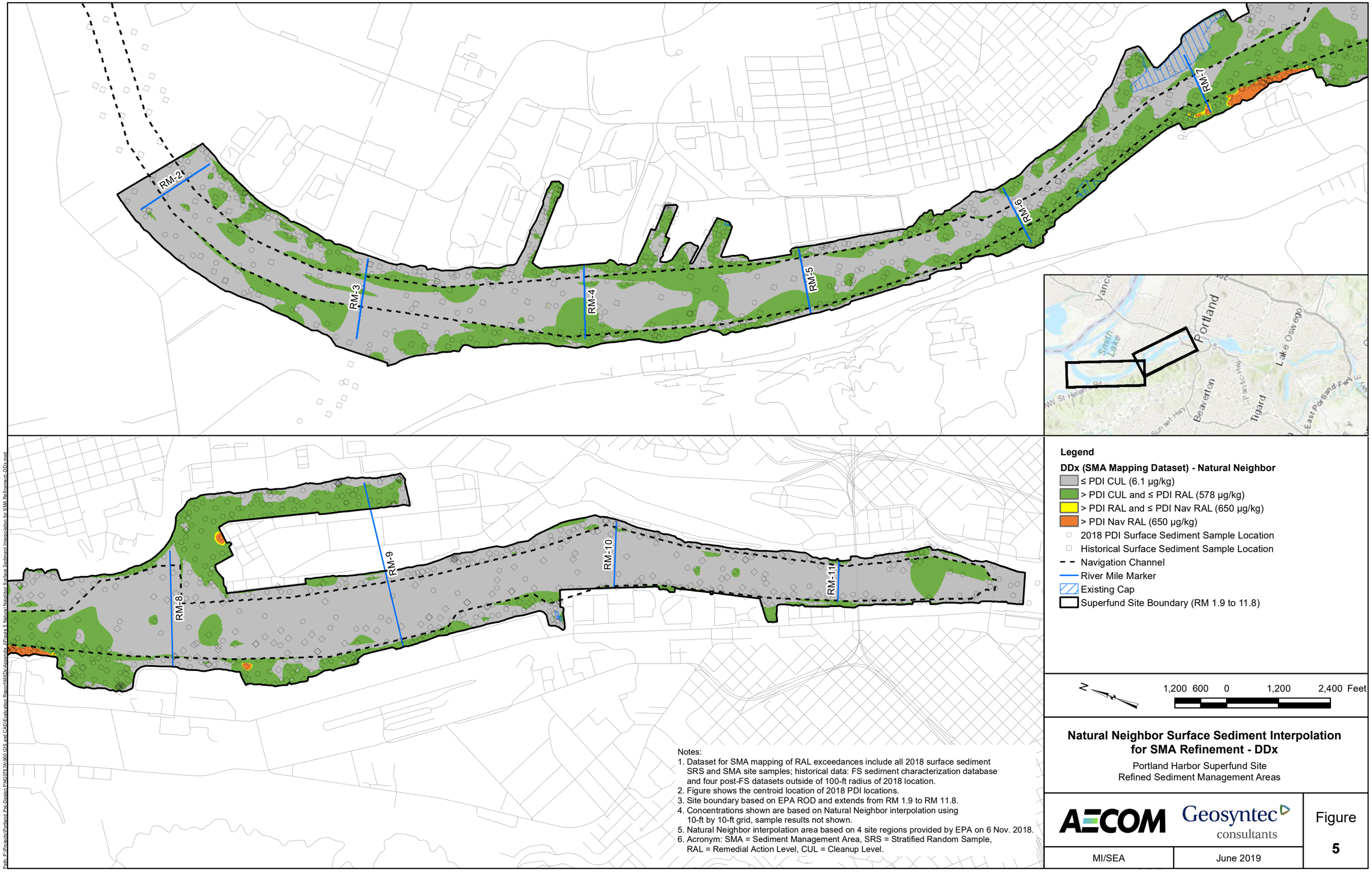
Natural Neighbor Surface Sediment Interpolation for SMA Refinement - total PAHs

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 4

Path: P:\Projects\Portland Pre-Design PKG\676\7A900 GIS and CAD\Evaluation Report\MXD\Appendix_A\Figure 4 Natural Neighbor Surface Sediment Interpolation for SMA Refinement - total PAHs.mxd



Notes:
1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

Natural Neighbor Surface Sediment Interpolation for SMA Refinement - DDx

Portland Harbor Superfund Site
Refined Sediment Management Areas

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MI/SEA	June 2019	Figure 5

Path: P:\Projects\Portland Pre-Design P\NG\67\7A900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 5 Natural Neighbor Surface Sediment Interpolation for SMA Refinement - DDx.mxd

Legend

2,3,7,8-TCDD (SMA Mapping Dataset) - Natural Neighbor

- ≤ PDI CUL (0.00025 µg/kg)
- > PDI CUL and ≤ PDI RAL (0.0011 µg/kg)
- > PDI RAL and ≤ PDI Nav RAL (0.002 µg/kg)
- > PDI Nav RAL (0.002 µg/kg)
- 2018 PDI Surface Sediment Sample Location
- Historical Surface Sediment Sample Location
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

1,200 600 0 1,200 2,400 Feet

Notes:

1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

Natural Neighbor Surface Sediment Interpolation for SMA Refinement 2,3,7,8 -TCDD

Portland Harbor Superfund Site
Refined Sediment Management Areas

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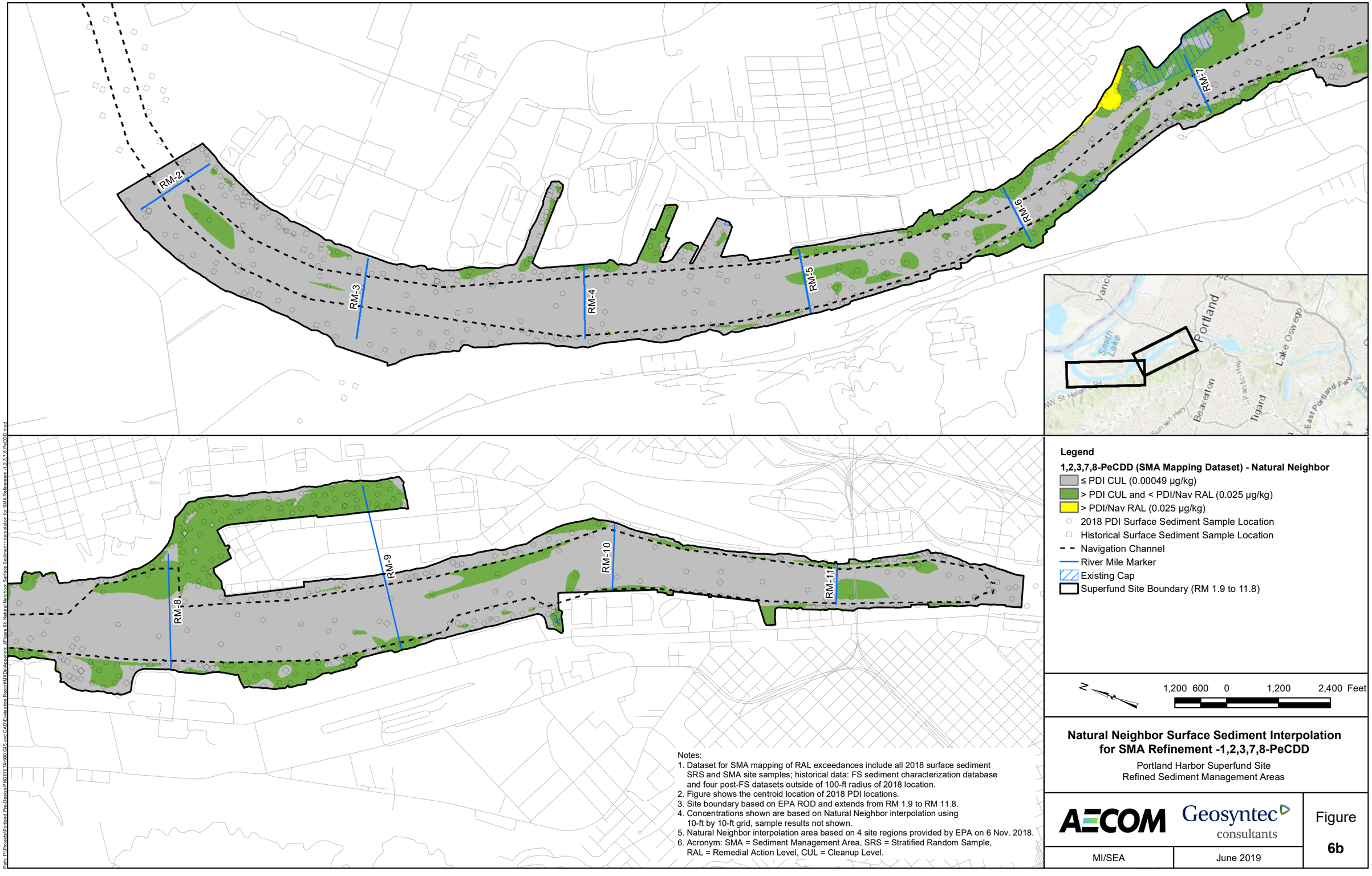
MI/SEA	June 2019	Figure 6a

Path: P:\Projects\Portland Pre-Design P\NG\67\7A900 GIS and CAD\Evaluation Report\MXD\Appendix J\Figure 6a Natural Neighbor Surface Sediment Interpolation for SMA Refinement TCDD.mxd



Legend

1,2,3,7,8-PeCDD (SMA Mapping Dataset) - Natural Neighbor

- ≤ PDI CUL (0.00049 µg/kg)
- > PDI CUL and < PDI/Nav RAL (0.025 µg/kg)
- > PDI/Nav RAL (0.025 µg/kg)
- 2018 PDI Surface Sediment Sample Location
- Historical Surface Sediment Sample Location
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

1,200 600 0 1,200 2,400 Feet

Notes:

1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

Natural Neighbor Surface Sediment Interpolation for SMA Refinement -1,2,3,7,8-PeCDD

Portland Harbor Superfund Site
Refined Sediment Management Areas

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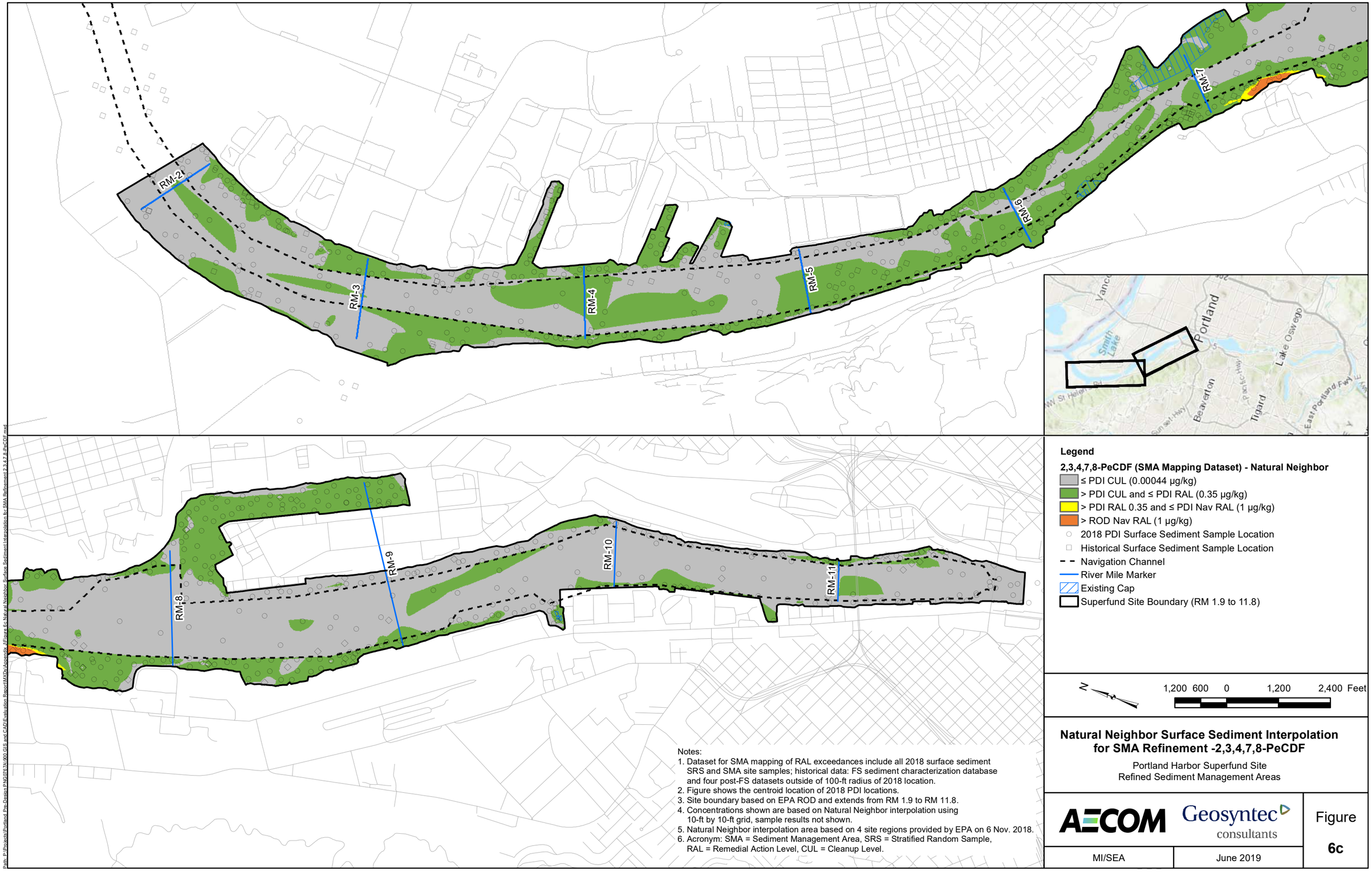
MI/SEA	June 2019	Figure 6b

Path: P:\Projects\Portland Pre-Design P\NG\676\7A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 6 b Natural Neighbor Surface Sediment Interpolation for SMA Refinement -1,2,3,7,8 PeCDD.mxd



Legend

2,3,4,7,8-PeCDF (SMA Mapping Dataset) - Natural Neighbor

- ≤ PDI CUL (0.00044 µg/kg)
- > PDI CUL and ≤ PDI RAL (0.35 µg/kg)
- > PDI RAL 0.35 and ≤ PDI Nav RAL (1 µg/kg)
- > ROD Nav RAL (1 µg/kg)
- 2018 PDI Surface Sediment Sample Location
- Historical Surface Sediment Sample Location
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

1,200 600 0 1,200 2,400 Feet

Notes:
1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; historical data: FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Figure shows the centroid location of 2018 PDI locations.
3. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
4. Concentrations shown are based on Natural Neighbor interpolation using 10-ft by 10-ft grid, sample results not shown.
5. Natural Neighbor interpolation area based on 4 site regions provided by EPA on 6 Nov. 2018.
6. Acronym: SMA = Sediment Management Area, SRS = Stratified Random Sample, RAL = Remedial Action Level, CUL = Cleanup Level.

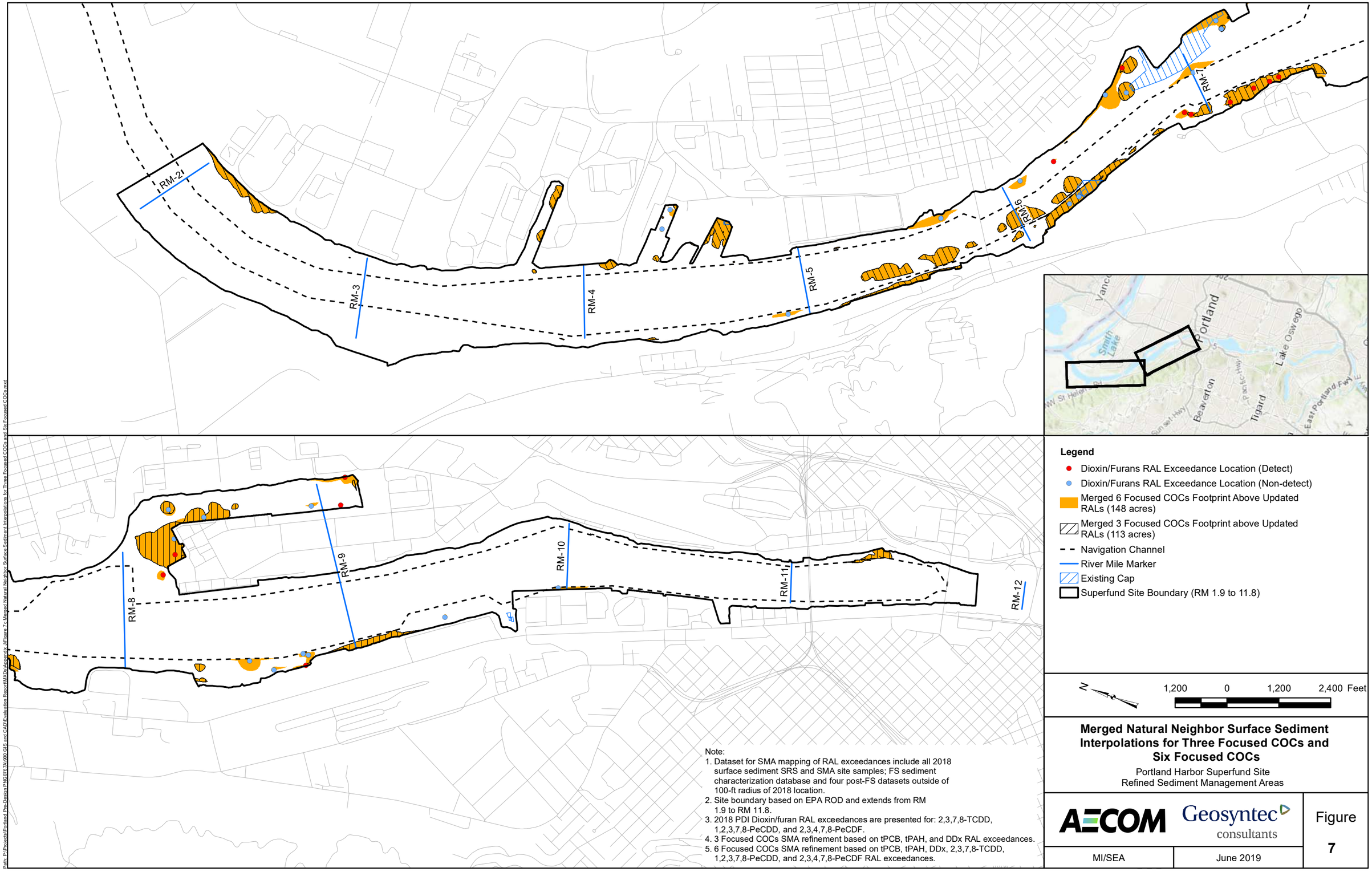
Natural Neighbor Surface Sediment Interpolation for SMA Refinement -2,3,4,7,8-PeCDF

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 6c

Path: P:\Projects\Portland Pre-Design P\NG\67\7A900 GIS and CAD\Evaluation Report\MXD\s\Appendix J\Figure 6c Natural Neighbor Surface Sediment Interpolation for SMA Refinement 2-3-4-7-8-PeCDF.mxd



Note:
1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
3. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
4. 3 Focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
5. 6 Focused COCs SMA refinement based on tPCB, tPAH, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF RAL exceedances.

Merged Natural Neighbor Surface Sediment Interpolations for Three Focused COCs and Six Focused COCs

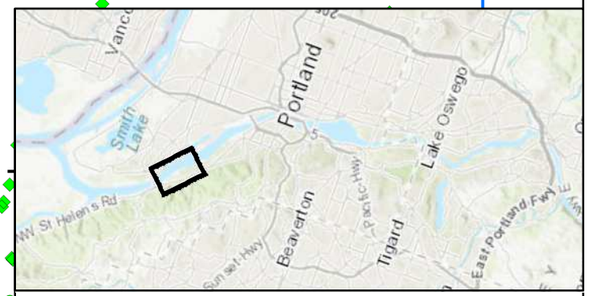
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 7

Path: P:\Projects\Portland_Pre-Design.PNG\0767A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_J\Figure 7 c Merged Natural Neighbor Surface Sediment Interpolations for Three Focused COCs and Six Focused COCs.mxd

RM-7



Legend

2018 PDI Sediment Sample Location
- Below RALs
- RAL Exceedance

Historical Sediment Sample Location
- Below RALs
- RAL Exceedance

Footprint Based on Merged 3 Focused COCs Above Updated RALs (113 acres)

ROD NAPL PTW Footprint

ROD SMA Footprint (365 acres)

Navigation Channel

River Mile Marker

Existing Cap

N

200 0 200 400 Feet

Note:

1. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database and four post-FS datasets outside of 100-ft radius of 2018 location.
2. Site boundary based on EPA ROD and extends from RM 1.9 to RM 11.8.
3. ROD Non-Aqueous Phase Liquid (NAPL) Principal Threat Waste (PTW) footprint was provided by EPA.

EPA ROD NAPL Area

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

Figure 8

MI/SEA | June 2019

Path: P:\Projects\Portland Pre-Design PNG\07670\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 8_EPA ROD NAPL Area.mxd

RM-2

RM-3

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

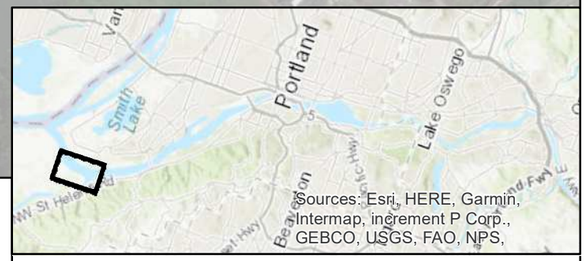
Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.



Post-GIS Adjustments to Three Focused COCs
RAL Exceedance Areas
RM 1.9 to 3.0

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 9a

Path: P:\Projects\Portland Pre-Design\PNG076TA\900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 9a Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

Focused COC	PDI RALs	
	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

GIS Anomaly

GIS Anomaly

RM-3

RM-4

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.

Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas RM 3.0 to 4.2

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 9b

Path: P:\Projects\Portland Pre-Design\PNG\767XA900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 9b Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

RM-4

RM-5

RM-6

GIS Anomaly

GIS Anomaly

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.

Post-GIS Adjustments to Three Focused COCs
RAL Exceedance Areas
RM 4.2 to 5.5
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

Figure **9c**

MI/SEA | June 2019

Path: P:\Projects\Portland Pre-Design PNG\676\A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 9c Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

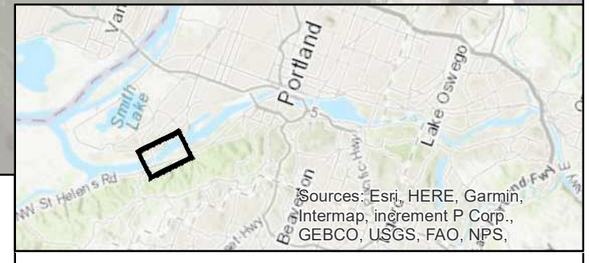
RM-6

RM-7

See note 5

GIS Anomaly

GIS Anomaly



Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.

Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas
RM 5.5 to 7.0
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 9d

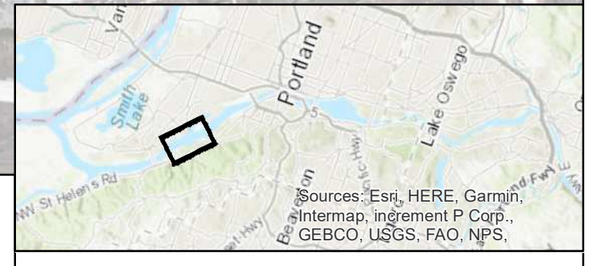
Path: P:\Projects\Portland Pre-Design\PNG076\7A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 9d Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

RM-7

RM-8

Part of the SMA footprint is driven by an RI/FS non-detect sample that was above the RAL for tPCBs



Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.

Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas
RM 7.0 to 8.2

Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 9e

Path: P:\Projects\Portland Pre-Design PNG\076TA\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 9e Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

RM-8

RM-9

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

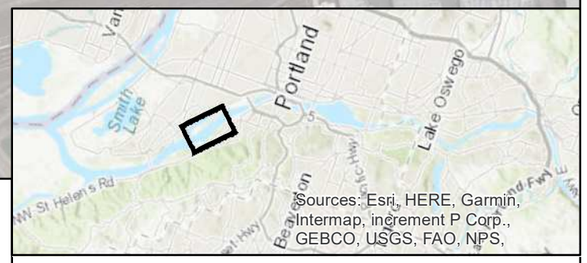
2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.



Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas
RM 8.2 to 9.5
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 9f

Path: P:\Projects\Portland Pre-Design PN60707A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_H\Figure 9f Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

RM-10

RM-11

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

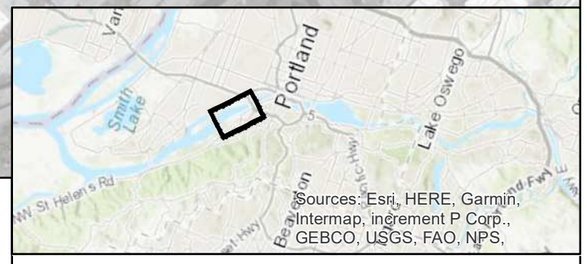
Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.



Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas
RM 9.5 to 11.0
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA | June 2019

Figure **9g**

Path: P:\Projects\Portland Pre-Design PN60707A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_J\Figure 9g Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd

	PDI RALs	
Focused COC	Outside Nav Channel (µg/kg)	Inside Nav channel (µg/kg)
Total PCBs	350	1,000
Total PAHs	30,000	170,000
DDx	578	650

RM-11

RM-12

Legend

Exceedance Footprint with Corrections
- Refined SMA footprint (111 acres)
- Excluded GIS Area (1.2 acres)
- Excluded Capped Area (0.5 acres)

2018 PDI Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

Historical Surface Sediment Sample Location
- Below PDI RALs
- PDI RAL Exceedance

- ROD SMA Footprint (365 acres)
- Navigation Channel
- River Mile Marker
- Existing Cap
- Superfund Site Boundary (RM 1.9 to 11.8)

N

500 250 0 500 1,000 Feet

Notes:
1. Aerial Imagery provided by ESRI Basemaps 2017.
2. Updated RAL exceedance for any of the 3 focused COCs: total PCBs, total PAHs, DDx. Updated RALs presented in Appendix I.
3. Dataset for SMA mapping of RAL exceedances include all 2018 surface sediment SRS and SMA site samples; FS sediment characterization database, and four post-FS datasets outside of 100- ft radius of 2018 sample location.
4. Callout boxes added for further clarification of post-GIS adjustments.
5. Sample locations in green (below the RALs) may be located within a RAL exceedance area because these samples were not analyzed for COC driving RAL exceedance interpolation.
6. Some SMAs are smaller than the size of the sample location and as a result a RAL exceedance sample may appear to be outside the SMA footprint, but is actually within a small SMA.
7. Acronyms: PDI = Pre-Design Investigation, µg/kg = micrograms per kilogram, ROD = record of decision, RAL = Remedial Action Level, SMA = Sediment Management Area.

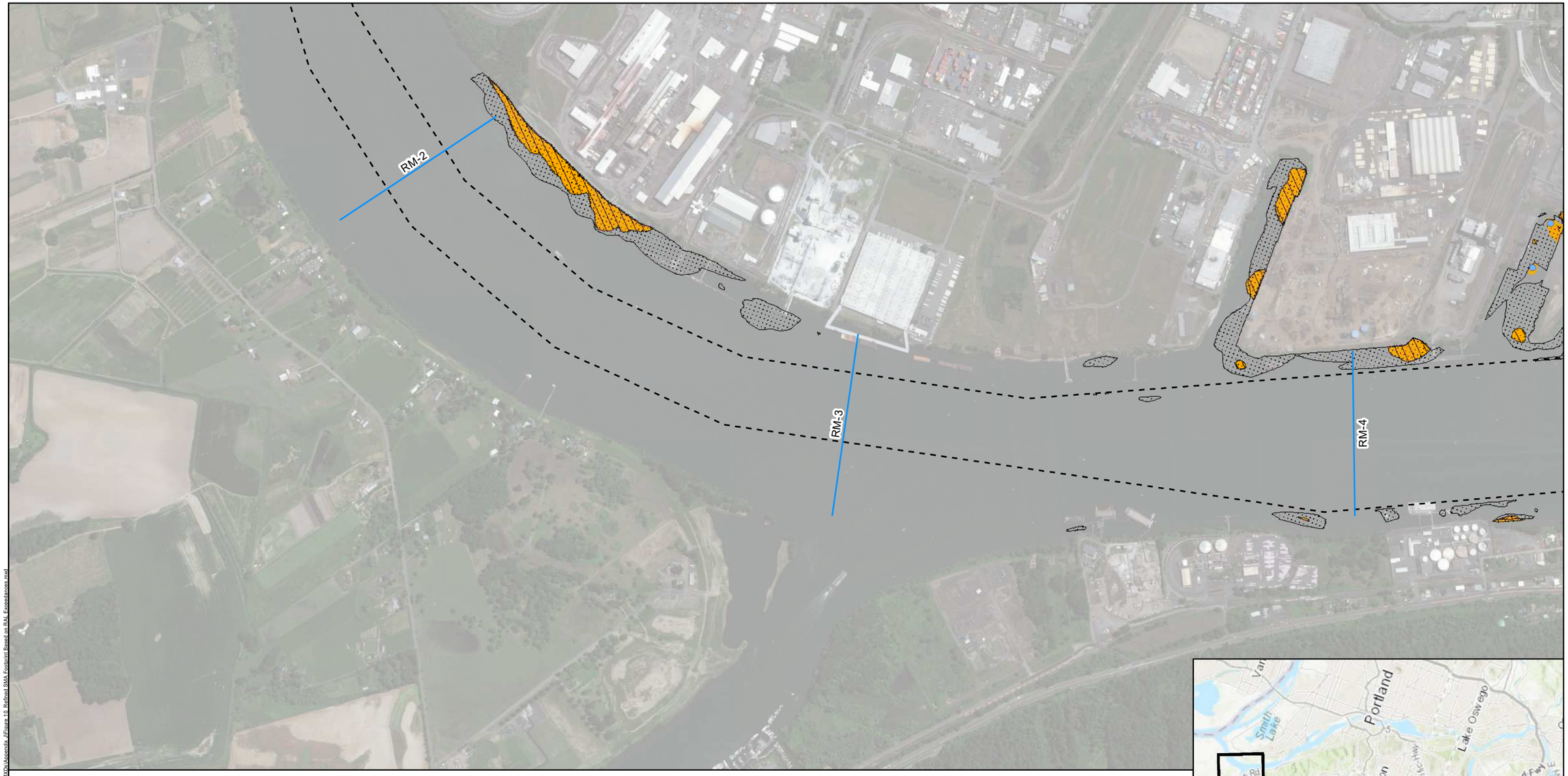
Post-GIS Adjustments to Three Focused COCs RAL Exceedance Areas
RM 11.0 to 11.8
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

Figure **9h**

MI/SEA | June 2019

Path: P:\Projects\Portland Pre-Design P\NG\07\7A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_J\Figure 9h Post-GIS ROD RAL Exceedance Area Adjustments Working.mxd



Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- ROD SMA Footprint (365 acres)
- Refined SMA Footprint (3 Focused COCs, 111 acres)
- Refined SMA Footprint (6 Focused COCs, 143 acres)
- Navigation Channel
- River Mile Marker

N

1,000 500 0 1,000 2,000 Feet

Notes:
1. Aerial imagery provided by ESRI Basemaps 2017.
2. Three focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
3. Six focused COCs SMA refinement based on total PCBs, total PAHs, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF RAL exceedances.
4. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
5. Acronyms: COCs = contaminants of concern, ROD = Record of Decisions, SMA = sediment management area

Refined SMA Footprint Based on RAL Exceedances
RM 1.9 to 4.0
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 10a

Path: P:\Projects\Portland Pre-Design PNG\0757A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 10 Refined SMA Footprint Based on RAL Exceedances.mxd

RM-4

RM-5

RM-6

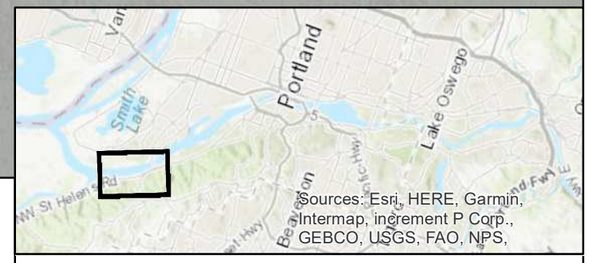
Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- ROD SMA Footprint (365 acres)
- Refined SMA Footprint (3 Focused COCs, 111 acres)
- Refined SMA Footprint (6 Focused COCs, 143 acres)
- Navigation Channel
- River Mile Marker

N

1,000 500 0 1,000 2,000 Feet

Notes:
1. Aerial imagery provided by ESRI Basemaps 2017.
2. Three focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
3. Six focused COCs SMA refinement based on total PCBs, total PAHs, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF RAL exceedances.
4. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
5. Acronyms: COCs = contaminants of concern, ROD = Record of Decisions, SMA = sediment management area



Refined SMA Footprint Based on RAL Exceedances
RM 4.0 to 6.0
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 10b

Path: P:\Projects\Portland Pre-Design\PNG\0757A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 10 Refined SMA Footprint Based on RAL Exceedances.mxd

RM-6

RM-7

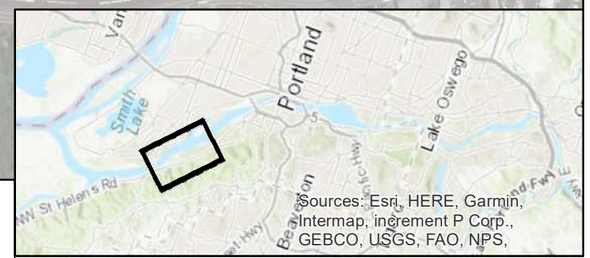
RM-8

Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- ROD SMA Footprint (365 acres)
- Refined SMA Footprint (3 Focused COCs, 111 acres)
- Refined SMA Footprint (6 Focused COCs, 143 acres)
- Navigation Channel
- River Mile Marker

1,000 500 0 1,000 2,000 Feet

Notes:
1. Aerial imagery provided by ESRI Basemaps 2017.
2. Three focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
3. Six focused COCs SMA refinement based on total PCBs, total PAHs, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF RAL exceedances.
4. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
5. Acronyms: COCs = contaminants of concern, ROD = Record of Decisions, SMA = sediment management area



Refined SMA Footprint Based on RAL Exceedances
RM 6.0 to 8.6
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

Figure **10c**

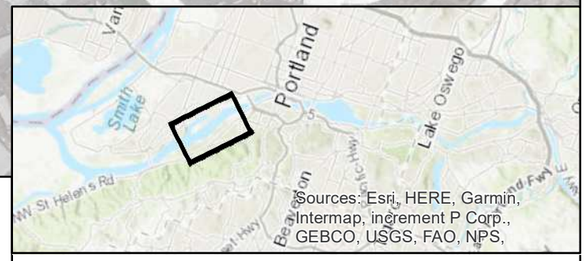
MI/SEA | June 2019

Path: P:\Projects\Portland Pre-Design PNG\676\2A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 10_Refined SMA Footprint Based on RAL Exceedances.mxd

RM-8

RM-9

RM-10



Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- ROD SMA Footprint (365 acres)
- Refined SMA Footprint (3 Focused COCs, 111 acres)
- Refined SMA Footprint (6 Focused COCs, 143 acres)
- Navigation Channel
- River Mile Marker

N

1,000 500 0 1,000 2,000 Feet

Notes:
1. Aerial imagery provided by ESRI Basemaps 2017.
2. Three focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
3. Six focused COCs SMA refinement based on total PCBs, total PAHs, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF RAL exceedances.
4. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
5. Acronyms: COCs = contaminants of concern, ROD = Record of Decisions, SMA = sediment management area

Refined SMA Footprint Based on RAL Exceedances
RM 8.6 to 10.0

Portland Harbor Superfund Site
Refined Sediment Management Areas

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Figure **10d**

Path: P:\Projects\Portland Pre-Design PN60767A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 10_Refined SMA Footprint Based on RAL Exceedances.mxd

RM-10

RM-11

RM-12

Legend

- Dioxin/Furans RAL Exceedance Location (Detect)
- Dioxin/Furans RAL Exceedance Location (Non-detect)
- ROD SMA Footprint (365 acres)
- Refined SMA Footprint (3 Focused COCs, 111 acres)
- Refined SMA Footprint (6 Focused COCs, 143 acres)
- Navigation Channel
- River Mile Marker

N

1,000 500 0 1,000 2,000 Feet

Notes:
1. Aerial imagery provided by ESRI Basemaps 2017.
2. Three focused COCs SMA refinement based on tPCB, tPAH, and DDx RAL exceedances.
3. Six focused COCs SMA refinement based on total PCBs, total PAHs, DDx, 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF RAL exceedances.
4. 2018 PDI Dioxin/furan RAL exceedances are presented for: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8-PeCDF.
5. Acronyms: COCs = contaminants of concern, ROD = Record of Decisions, SMA = sediment management area

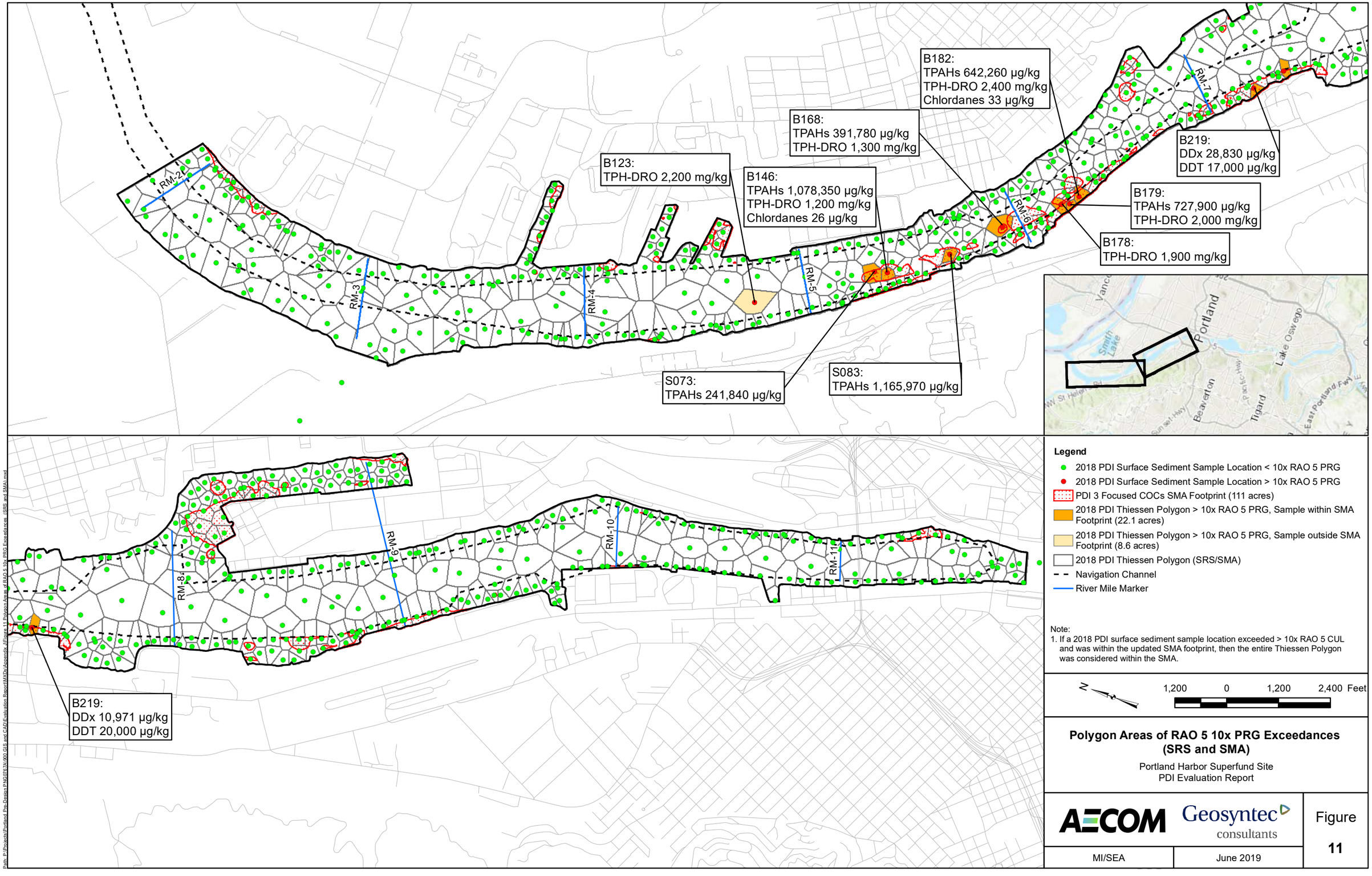
Refined SMA Footprint Based on RAL Exceedances
RM 10.0 to 11.8
Portland Harbor Superfund Site
Refined Sediment Management Areas

AECOM Geosyntec consultants

MI/SEA | June 2019

Figure **10e**

Path: P:\Projects\Portland Pre-Design PNG\0757A\900 GIS and CAD\Evaluation Report\MXDs\Appendix_A\Figure 10 Refined SMA Footprint Based on RAL Exceedances.mxd



Path: P:\Projects\Portland Pre-Design\PNG\0767A\900 GIS and CAD\Evaluation Report\MXDs\Appendix J\Figure 11 Polygon Areas of RAO 5 10x PRG Exceedances (SRS and SMA).mxd

Polygon Areas of RAO 5 10x PRG Exceedances (SRS and SMA)

Portland Harbor Superfund Site
PDI Evaluation Report

AECOM Geosyntec consultants

MI/SEA	June 2019	Figure 11

EXHIBITS

EXHIBIT A

Historical Sample Replacement with PDI Samples

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B010-BL1	**--**	**03/31/2018**	**0-26**	**8**	**--**	**306**	**--**	**3**	**--**
LW2-G003	49	07/21/2004	0-27	23	▲	460	▲	7	▲
PDI-SG-B011-BL1	**--**	**03/31/2018**	**0-30**	**33**	**--**	**375**	**--**	**3**	**--**
LW2-G007	33	07/20/2004	0-27	220	▲	830	▲	5	▲
LW2-G007-2	40	07/20/2004	0-27	410	▲	400	▬	6	▲
PDI-SG-B016-BL1	**--**	**04/01/2018**	**0-15**	**1.1**	**--**	**244**	**--**	**0.5**	**--**
LW2-B001	84	07/27/2004	0-15	2	▲	100	▼	18	▲
PDI-SG-B017-BL1	--	**03/31/2018**	**0-30**	**8**	**--**	**345**	**--**	**3**	**--**
LW2-G016	71	07/23/2004	0-29	27	▲	300	▬	7	▲
PDI-SG-B020-BL1/PDI-SG-B020-BL1-D	--	**04/01/2018**	**0-28**	**8**	**--**	**514**	**--**	**7**	**--**
WLCDRD05PG002	63	05/27/2005	0-30	31	▲	570	▬	7	▬
PDI-SG-B022-BL1	--	**03/31/2018**	**0-30**	**5**	**--**	**630**	**--**	**2**	**--**
WLR0797WRBC10	69	07/24/1997	0-24	40	▲	2,350	▲	5	▲
PDI-SG-B024-BL1	**--**	**04/01/2018**	**0-30**	**9**	**--**	**517**	**--**	**6**	**--**
LW3-G605	87	11/27/2007	0-30	12	▲	440	▬	6	▬
PDI-SG-B043-BL1	--	**04/10/2018**	**0-25**	**13**	**--**	**4,136**	**--**	**4**	**--**
WLCDRD05PG004	94	05/27/2005	0-27	49	▲	6,800	▲	10	▲
PDI-SG-B054-BL1	**--**	**04/06/2018**	**0-22**	**1.1**	**--**	**85**	**--**	**0.5**	**--**
LW2-G050	53	08/04/2004	0-24	3	▲	1,600	▲	7	▲
PDI-SG-B059-BL1	**--**	**04/06/2018**	**0-29**	**6**	**--**	**669**	**--**	**3**	**--**
LW2-G055	32	07/27/2004	0-29	23	▲	350	▼	4	▲
PDI-SG-B063-BL1	**--**	**04/06/2018**	**0-28**	**5**	**--**	**1,377**	**--**	**2**	**--**
LW2-G058	79	07/27/2004	0-29	26	▲	250	▼	3	▲
PDI-SG-B064-BL1	**--**	**04/08/2018**	**0-30**	**7**	**--**	**841**	**--**	**6**	**--**
LW2-G063	22	08/05/2004	0-27	18	▲	820	▬	5	▬

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B065-BL1	**--**	**04/08/2018**	**0-30**	**8**	**--**	**861**	**--**	**6**	**--**
LW3-GCA03W	89	11/21/2007	0-17	15	▲	1,400	▲	6	▬
PDI-SG-B067-BL1	**--**	**04/06/2018**	**0-30**	**13**	**--**	**873**	**--**	**4**	**--**
LWG0103R003SDS015C10	85	10/17/2002	0-15	9	▼	1,500	▲	7	▲
LWG0103R003SDS015C20	87	10/17/2002	0-15	28	▲	1,700	▲	4	▬
LWG0103R003SDS015C30	92	10/17/2002	0-15	21	▲	920	▬	5	▬
WR-WSI98SD006	97	09/18/1997	0-10	--	--	1,300	▲	--	--
PDI-SG-B068-BL1	**--**	**04/06/2018**	**0-30**	**8**	**--**	**397**	**--**	**4**	**--**
LW3-G613	36	12/05/2007	0-30	26	▲	480	▲	6	▲
PDI-SG-B075-BL1	**--**	**04/08/2018**	**0-26**	**9**	**--**	**445**	**--**	**4**	**--**
LW2-G075	48	08/02/2004	0-28	6	▼	160	▼	3	▼
LW2-G075-2	49	08/02/2004	0-28	6	▼	240	▼	3	▼
PDI-SG-B076-BL1	**--**	**04/08/2018**	**0-28**	**16**	**--**	**627**	**--**	**6**	**--**
LW3-G784	44	11/28/2007	0-30	54	▲	610	▬	8	▲
PDI-SG-B077-BL1	**--**	**05/11/2018**	**0-27**	**30**	**--**	**605**	**--**	**6**	**--**
LW2-G082	1	08/02/2004	0-27	190	▲	200	▼	2	▼
LW2-GBT005	79	12/16/2005	0-10	34	▬	350	▼	4	▼
WR-WSI98SD012	87	09/18/1997	0-10	39	▲	1,000	▲	3	▼
PDI-SG-B078-BL1	**--**	**05/09/2018**	**0-22**	**72**	**--**	**855**	**--**	**18**	**--**
LW2-G080	45	07/28/2004	0-24	66	▬	590	▼	2	▼
WLCITG08SED03	54	07/10/2008	0-15	200	▲	2,000	▲	--	--
WLCITG08SED04	50	07/10/2008	0-15	480	▲	3,900	▲	--	--
WLCITG08SED14	60	07/25/2008	0-15	710	▲	15,000	▲	--	--
PDI-SG-B081-BL1/PDI-SG-B081-BL1-D	**--**	**04/09/2018**	**0-30**	**10**	**--**	**1,681**	**--**	**6**	**--**
WLCDRD05PG006	93	05/26/2005	0-30	34	▲	675	▼	8	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B083-BL1	**--**	**04/09/2018**	**0-30**	**164**	**--**	**1,040**	**--**	**6**	**--**
LW2-G107	93	07/29/2004	0-29	24	▼	1,000	▬	58	▲
PDI-SG-B088-BL1	**--**	**04/09/2018**	**0-30**	**--**	**--**	**6,517**	**--**	**--**	**--**
WR-WSI98SD015	57	09/17/1997	0-10	--	--	2,700	▼	--	--
PDI-SG-B090-BL1	**--**	**04/10/2018**	**0-25**	**20**	**--**	**4,074**	**--**	**9**	**--**
LW2-G117	99	08/03/2004	0-28	26	▲	3,200	▼	8	▬
LW3-GCA04W	84	11/19/2007	0-16	11	▼	7,600	▲	140	▲
PDI-SG-B091-BL1	**--**	**04/09/2018**	**0-30**	**8**	**--**	**5,441**	**--**	**7**	**--**
LW2-C522	97	10/19/2005	0-30	61	▲	3,000	▼	16	▲
LW2-G116	81	08/03/2004	0-27	30	▲	3,000	▼	9	▲
LW2-G121	29	08/03/2004	0-30	21	▲	1,600	▼	33	▲
WLCGXV99S4	45	10/08/1999	0-10	130	▲	660	▼	33	▲
WR-WSI98SD017	15	09/17/1997	0-10	--	--	1,400	▼	--	--
WR-WSI98SD018	70	09/17/1997	0-10	--	--	3,100	▼	--	--
PDI-SG-B094-BL1	**--**	**04/09/2018**	**0-29**	**26**	**--**	**751**	**--**	**5**	**--**
LW2-G112	95	08/03/2004	0-29	270	▲	550	▼	7	▲
PDI-SG-B096-BL1/PDI-SG-B096-BL1-D	**--**	**06/20/2018**	**0-27**	**6**	**--**	**1,379**	**--**	**5**	**--**
LW2-G120	38	08/05/2004	0-29	22	▲	1,400	▬	12	▲
PDI-SG-B097-BL1	**--**	**07/10/2018**	**0-28**	**--**	**--**	**327**	**--**	**--**	**--**
WR-WSI98SD016	95	09/18/1997	0-10	--	--	1,800	▲	--	--
PDI-SG-B098-BL1	**--**	**04/10/2018**	**0-30**	**9**	**--**	**11,328**	**--**	**6**	**--**
KM-08-A-PG	91	12/01/2005	0-20	--	--	130	▼	--	--
LW2-G126	76	10/07/2004	0-30	2	▼	260	▼	--	--
R2-KM-2-PG	57	12/01/2005	0-30	--	--	1,400	▼	--	--
WLCGXV99S2	61	10/08/1999	0-10	130	▲	21,600	▲	27	▲
WR-WSI98SD020	62	09/23/1997	0-10	38	▲	860	▼	4	▼

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B101-BL1	**--**	**04/11/2018**	**0-27**	**13**	**--**	**684**	**--**	**6**	**--**
WLCT4C04VC13	64	03/19/2004	0-30	1,000	▲	5,300	▲	79	▲
PDI-SG-B102-BL1	**--**	**06/13/2018**	**0-28**	**26**	**--**	**2,838**	**--**	**9**	**--**
WLCT4C04VC15	8	03/16/2004	0-30	140	▲	21,000	▲	21	▲
WR-WSI98SD023	73	09/18/1997	0-10	--	--	39,000	▲	--	--
PDI-SG-B104-BL1	**--**	**04/10/2018**	**0-23**	**11**	**--**	**4,155**	**--**	**8**	**--**
LW3-G625	95	11/04/2007	0-30	23	▲	1,400	▼	6	▼
WLCDRD05PG018	63	05/26/2005	0-30	23	▲	2,400	▼	21	▲
WLCOFJ022403	48	10/22/2002	0-15	--	--	5,900	▲	192	▲
WLCOFJ022404	72	10/22/2002	0-15	--	--	3,000	▼	26	▲
PDI-SG-B106-BL1	**--**	**04/10/2018**	**0-30**	**--**	**--**	**587**	**--**	**--**	**--**
WR-WSI98SD026	61	09/17/1997	0-10	--	--	1,300	▲	--	--
PDI-SG-B107-BL1	**--**	**04/11/2018**	**0-28**	**6**	**--**	**799**	**--**	**4**	**--**
LW3-G628	79	11/14/2007	0-30	11	▲	570	▼	4	▬
PDI-SG-B109-BL1	**--**	**04/11/2018**	**0-26**	**7**	**--**	**939**	**--**	**7**	**--**
WLCT4C04VC21	96	03/11/2004	0-30	50	▲	2,700	▲	37	▲
WLCT4J98HCS43	79	10/15/1998	0-10	--	--	11,000	▲	28	▲
PDI-SG-B112-BL1	**--**	**04/16/2018**	**0-30**	**16**	**--**	**3,998**	**--**	**11**	**--**
LW3-GSP04W	31	10/16/2007	0-14	160	▲	5,700	▲	4	▼
PDI-SG-B115-BL1	**--**	**04/16/2018**	**0-30**	**12**	**--**	**933**	**--**	**4**	**--**
LW2-B012	69	07/29/2004	0-15	2	▼	920	▬	3	▼
LW2-C138	46	09/30/2004	0-30	--	--	--	--	11	▲
LW2-G136	85	08/09/2004	0-27	54	▲	3,100	▲	7	▲
LW2-G138	51	08/13/2004	0-22	3	▼	4,300	▲	--	--
LW2-GBT011	51	12/15/2005	0-10	15	▲	2,200	▲	65	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B116-BL1	**--**	**04/12/2018**	**0-22**	**3**	**--**	**5,829**	**--**	**5**	**--**
WLCT4C04VC27	62	03/09/2004	0-30	29	▲	3,300	▼	5	▬
WLCT4J98HCS34	44	10/15/1998	0-10	--	--	11,000	▲	--	--
PDI-SG-B117-BL1	**--**	**06/14/2018**	**0-30**	**11**	**--**	**72,250**	**--**	**13**	**--**
WLCT4C04VC32	22	03/03/2004	0-30	88	▲	39,000	▼	23	▲
WLCT4L08T4IM11	68	12/29/2008	0-15	--	--	8,400	▼	--	--
WLCT4L08T4IM12	41	12/29/2008	0-15	--	--	49,000	▼	--	--
WLCT4L08T4IMC04	54	12/29/2008	0-15	28	▲	--	--	25	▲
WR-WSI98SD031	80	09/18/1997	0-10	--	--	42,000	▼	--	--
PDI-SG-B119-BL1	**--**	**04/11/2018**	**0-30**	**7**	**--**	**1,316**	**--**	**5**	**--**
LW2-G140	56	08/10/2004	0-26	54	▲	4,000	▲	53	▲
LW2-G140-2	48	08/10/2004	0-23	3	▼	960	▼	4	▼
PDI-SG-B120-BL1/PDI-SG-B120-BL1-D	**--**	**04/12/2018**	**0-22**	**8**	**--**	**18,307**	**--**	**4**	**--**
WLCT4G06T4B41403	81	07/20/2006	0-30	--	--	17,000	▬	--	--
WLCT4G06T4PI09	73	12/13/2007	0-30	19	▲	1,400	▼	69	▲
WLCT4L08T4IM13	71	12/29/2008	0-15	--	--	380	▼	--	--
WLCT4L08T4IM14	82	12/29/2008	0-15	--	--	1,160	▼	--	--
WLCT4L08T4IMC01	75	12/29/2008	0-15	48	▲	--	--	8	▲
PDI-SG-B121-BL1	**--**	**04/12/2018**	**0-27**	**7**	**--**	**1,336**	**--**	**5**	**--**
LW2-GBT010	40	12/16/2005	0-10	12	▲	1,800	▲	16	▲
WLCT4C04VC31	85	03/08/2004	0-30	49	▲	7,500	▲	12	▲
WLCT4J98HCS40	76	10/15/1998	0-10	--	--	18,000	▲	--	--
WR-WSI98SD034	80	09/18/1997	0-10	39	▲	9,400	▲	3	▼
PDI-SG-B122-BL1/PDI-SG-B122-BL1-D	**--**	**04/11/2018**	**0-30**	**34**	**--**	**2,426**	**--**	**13**	**--**
LW2-G143	41	08/13/2004	0-30	43	▲	2,800	▬	10	▼

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B126-BL1	**--**	**04/11/2018**	**0-30**	**17**	**--**	**3,313**	**--**	**13**	**--**
LW2-G148	24	08/18/2004	0-21	--	--	2,700	▬	--	--
LW2-G150	74	08/18/2004	0-24	25	▲	43,000	▲	10	▼
WLCASF97S028	88	06/10/1997	0-10	--	--	1,500	▼	--	--
WR-WSI98SD037	88	09/19/1997	0-10	--	--	1,500	▼	--	--
PDI-SG-B127-BL1	**--**	**04/12/2018**	**0-30**	**9**	**--**	**1,472**	**--**	**5**	**--**
LW3-G634	83	11/27/2007	0-29	38	▲	1,200	▬	11	▲
PDI-SG-B128-BL1	**--**	**05/29/2018**	**0-30**	**6**	**--**	**2,895**	**--**	**5**	**--**
LW2-C158	61	09/28/2004	0-30	31	▲	4,600	▲	10	▲
LWP1-ARC03B	53	11/23/2004	0-30	--	--	110,000	▲	--	--
LWP1-ARC06B-1	87	11/23/2004	0-30	--	--	66,000	▲	--	--
WLCBPE06SS39	72	05/18/2006	0-15	--	--	53,000	▲	--	--
WLCBPE06SS40	50	05/18/2006	0-17	--	--	27,800	▲	--	--
WLCBPE06SS41	85	05/18/2006	0-17	--	--	40,000	▲	--	--
WR-WSI98SD039	67	09/19/1997	0-10	--	--	6,400	▲	--	--
PDI-SG-B129-BL1	**--**	**05/19/2018**	**0-30**	**7**	**--**	**1,816**	**--**	**5**	**--**
LW2-G166	77	09/08/2004	0-20	3	▼	1,400	▼	1	▼
WLCBPE06SS17	51	05/18/2006	0-15	--	--	2,100	▬	--	--
WLCBPE06SS42	97	05/18/2006	0-15	--	--	9,750	▲	--	--
WLCBPE06SS44	32	05/19/2006	0-17	--	--	5,300	▲	--	--
WLCBPE06SS45	88	05/19/2006	0-17	--	--	3,800	▲	--	--
WR-WSI98SD041	86	09/19/1997	0-10	--	--	69,000	▲	--	--
PDI-SG-B130-BL1	**--**	**04/12/2018**	**0-30**	**10**	**--**	**1,170**	**--**	**12**	**--**
LW2-G149	75	08/13/2004	0-30	13	▲	780	▼	14	▬
PDI-SG-B131-BL1	**--**	**04/12/2018**	**0-30**	**4**	**--**	**660**	**--**	**5**	**--**
LW2-G149	52	08/13/2004	0-30	13	▲	780	▬	14	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B133-BL1	**--**	**04/16/2018**	**0-29**	**3**	**--**	**568**	**--**	**3**	**--**
LW2-C169	66	09/22/2004	0-30	16	▲	--	--	10	▲
LW2-G169	67	08/11/2004	0-28	--	--	1,200	▲	--	--
LW2-G170	69	08/11/2004	0-29	10	▲	1,900	▲	4	▲
WLCASF97S027	70	06/10/1997	0-10	--	--	2,500	▲	--	--
WR-WSI98SD043	77	09/19/1997	0-10	--	--	2,500	▲	--	--
PDI-SG-B134-BL1	**--**	**04/12/2018**	**0-30**	**--**	**--**	**536**	**--**	**--**	**--**
WR-WSI98SD042	53	09/19/1997	0-10	--	--	960	▲	--	--
PDI-SG-B135-BL1	**--**	**04/12/2018**	**0-30**	**--**	**--**	**1,075**	**--**	**--**	**--**
LW2-G173	12	08/11/2004	0-28	--	--	520	▼	--	--
LW2-G174	68	08/11/2004	0-26	--	--	930	▬	--	--
WLCASF97S026	79	06/10/1997	0-10	--	--	2,000	▲	--	--
PDI-SG-B137-BL1	**--**	**05/16/2018**	**0-30**	**4**	**--**	**9,751**	**--**	**4**	**--**
LW2-G179	14	08/10/2004	0-24	3	▼	130,000	▲	140	▲
WLCASF97S045	44	06/11/1997	0-10	--	--	12,500	▲	--	--
WR-WSI98SD046	61	09/19/1997	0-10	--	--	1,300	▼	--	--
PDI-SG-B139-BL1	**--**	**04/12/2018**	**0-30**	**7**	**--**	**1,688**	**--**	**7**	**--**
LW2-G184	67	08/10/2004	0-21	64	▲	840	▼	6	▬
LW2-G185	41	08/18/2004	0-28	--	--	4,200	▲	--	--
WLCASF97S047	22	06/11/1997	0-10	--	--	3,400	▲	--	--
WLCDRD05PG036	22	05/26/2005	0-30	22	▲	1,600	▬	12	▲
PDI-SG-B141-BL1	**--**	**04/11/2018**	**0-28**	**9**	**--**	**3,259**	**--**	**3**	**--**
WR-WSI98SD049	53	09/19/1997	0-10	38	▲	2,500	▼	4	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B142-BL1	**--**	**04/13/2018**	**0-30**	**9**	**--**	**511**	**--**	**4**	**--**
LW2-G175	97	08/17/2004	0-26	17	▲	650	▲	5	▲
LW3-G637-1	16	11/15/2007	0-29	34	▲	4,400	▲	13	▲
LW3-G637-2	9	11/15/2007	0-29	29	▲	4,100	▲	8	▲
WLCDRD05PG017	65	05/26/2005	0-30	29	▲	1,600	▲	8	▲
PDI-SG-B144-BL1	**--**	**04/12/2018**	**0-30**	**5**	**--**	**2,368**	**--**	**11**	**--**
LW2-G189	51	08/18/2004	0-28	28	▲	5,100	▲	130	▲
WLCASF97S023	57	06/10/1997	0-10	--	--	3,600	▲	--	--
WLCASF97S024	60	06/10/1997	0-10	--	--	3,900	▲	--	--
WR-WSI98SD050	62	09/19/1997	0-10	--	--	2,600	▬	--	--
PDI-SG-B145-BL1	**--**	**04/13/2018**	**0-30**	**12**	**--**	**906**	**--**	**4**	**--**
LW2-G186	54	08/17/2004	0-21	11	▬	13,000	▲	2	▼
PDI-SG-B148-BL1	**--**	**04/13/2018**	**0-30**	**16**	**--**	**2,685**	**--**	**9**	**--**
LW2-G188	21	08/17/2004	0-28	32	▲	1,900	▼	6	▼
WLCDRD05PG021	27	05/26/2005	0-30	36	▲	2,100	▼	15	▲
PDI-SG-B149-BL1	**--**	**04/12/2018**	**0-30**	**6**	**--**	**1,920**	**--**	**8**	**--**
LW2-G195	19	08/18/2004	0-28	29	▲	5,900	▲	13	▲
WLCASF97S022	92	06/10/1997	0-10	--	--	5,300	▲	--	--
PDI-SG-B151-BL1	**--**	**04/14/2018**	**0-25**	**20**	**--**	**4,290**	**--**	**10**	**--**
LW2-G192	97	10/21/2004	0-25	58	▲	3,200	▼	7	▼
LW3-GSP05E	74	10/16/2007	0-18	19	▬	3,200	▼	85	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B154-BL1	**--**	**04/14/2018**	**0-27**	**141**	**--**	**12,667**	**--**	**27**	**--**
LW2-C196	72	09/30/2004	0-30	66	▼	--	--	12	▼
LW2-G196	90	07/19/2004	0-24	--	--	13,000	▬	--	--
LW2-G197	98	08/25/2004	0-25	57	▼	7,800	▼	9	▼
LW2-G197-2	99	08/26/2004	0-25	55	▼	7,700	▼	21	▼
LW3-G643	70	11/15/2007	0-30	27	▼	4,800	▼	7	▼
WLCDRD05PG023	22	05/26/2005	0-20	190	▲	5,200	▼	28	▬
PDI-SG-B155-BL1	**--**	**06/20/2018**	**0-30**	**147**	**--**	**15,322**	**--**	**11**	**--**
LW2-G202	26	09/07/2004	0-26	69	▼	2,200	▼	9	▼
LW2-G206	70	10/21/2004	0-26	130	▬	4,900	▼	234	▲
WLCMCB02SED02	90	02/08/2002	0-15	--	--	5,800	▼	--	--
WR-WSI98SD053	39	09/19/1997	0-10	--	--	4,800	▼	--	--
PDI-SG-B157-BL1	**--**	**04/13/2018**	**0-25**	**4**	**--**	**3,343**	**--**	**4**	**--**
LW3-GCR05W	62	10/16/2007	0-17	12	▲	4,700	▲	15	▲
WLCASF97S019	93	06/10/1997	0-10	--	--	11,000	▲	--	--
WR-WSI98SD055	90	09/19/1997	0-10	39	▲	2,000	▼	8	▲
PDI-SG-B158-BL1	**--**	**04/13/2018**	**0-30**	**24**	**--**	**11,029**	**--**	**21**	**--**
LW2-G228	97	08/10/2004	0-26	25	▬	9,100	▬	20	▬
LW2-G520	99	09/10/2004	0-30	29	▲	2,700	▼	22	▬
LW3-GCA05W	38	11/21/2007	0-17	16	▼	4,000	▼	24	▬
WLCDRD05PG048	59	05/26/2005	0-30	36	▲	16,050	▲	28	▲
WLCMFH00SD02	89	08/08/2000	0-20	--	--	1,300	▼	--	--
PDI-SG-B159-BL1	**--**	**04/16/2018**	**0-29**	**--**	**--**	**16,933**	**--**	**--**	**--**
WLCMCB02SED01	82	02/08/2002	0-15	--	--	2,500	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B160-BL1	**--**	**04/17/2018**	**0-30**	**9**	**--**	**3,451**	**--**	**14**	**--**
LW2-G229	60	08/17/2004	0-28	4	▼	4,400	▲	17	▬
LW2-G230	65	08/10/2004	0-26	32	▲	6,900	▲	51	▲
LWG0105R020SDS015C00	37	10/16/2002	0-15	15	▲	37,000	▲	47	▲
PDI-SG-B162-BL1	**--**	**04/14/2018**	**0-29**	**128**	**--**	**1,314**	**--**	**3**	**--**
WLCDRD05PG027	91	05/26/2005	0-20	240	▲	965	▼	26	▲
PDI-SG-B163-BL1	**--**	**04/16/2018**	**0-26**	**80**	**--**	**5,580**	**--**	**9**	**--**
WLCDRD05PG027	18	05/26/2005	0-20	240	▲	965	▼	26	▲
WLCOFJ025201	69	10/23/2002	0-10	--	--	480	▼	2	▼
WLCOFJ025202	43	10/23/2002	0-15	--	--	8,200	▲	16	▲
PDI-SG-B165-BL1	**--**	**04/13/2018**	**0-30**	**7**	**--**	**2,033**	**--**	**7**	**--**
LW2-G240	77	08/12/2004	0-28	4	▼	7,600	▲	68	▲
LW2-G241	46	08/18/2004	0-24	13	▲	3,200	▲	26	▲
LW2-G242	76	08/12/2004	0-27	4	▼	7,900	▲	342	▲
WLCMFH00SD05	86	08/08/2000	0-20	77	▲	98,000	▲	--	--
PDI-SG-B166-BL1	**--**	**04/13/2018**	**0-30**	**10**	**--**	**4,308**	**--**	**12**	**--**
LW2-G245	65	08/12/2004	0-28	24	▲	8,300	▲	33	▲
PDI-SG-B167-BL1	**--**	**04/16/2018**	**0-24**	**117**	**--**	**6,381**	**--**	**8**	**--**
LW2-G226	67	07/30/2004	0-26	34	▼	5,400	▬	15	▲
PDI-SG-B168-BL1	**--**	**04/17/2018**	**0-22**	**4**	**--**	**391,780**	**--**	**75**	**--**
LW3-G652	73	11/28/2007	0-25	14	▲	8,400	▼	2	▼
PDI-SG-B169-BL1	**--**	**04/17/2018**	**0-22**	**6**	**--**	**183**	**--**	**0.7**	**--**
LW2-G233	87	09/10/2004	0-26	27	▲	11,000	▲	18	▲
PDI-SG-B170-BL1	**--**	**04/14/2018**	**0-30**	**117**	**--**	**55,580**	**--**	**301**	**--**
LW2-C531	77	10/26/2005	0-30	72	▼	32,000	▼	29	▼
LW3-G654	63	11/15/2007	0-30	150	▲	58,000	▬	170	▼

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Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B172-BL1	**--**	**07/20/2018**	**0-30**	**8**	**--**	**2,114**	**--**	**9**	**--**
LW2-C529	69	10/27/2005	0-30	11	▲	3,300	▲	14	▲
LW3-G656	25	11/16/2007	0-30	68	▲	7,000	▲	14	▲
PDI-SG-B173-BL1	**--**	**04/17/2018**	**0-22**	**3**	**--**	**196**	**--**	**0.7**	**--**
LW3-G657	94	11/28/2007	0-26	1	▼	550	▲	1	▲
PDI-SG-B174-BL1	**--**	**07/20/2018**	**0-29**	**11**	**--**	**10,468**	**--**	**17**	**--**
LW2-C527	99	10/26/2005	0-30	140	▲	41,000	▲	230	▲
LW2-C528	92	10/26/2005	0-30	49	▲	9,000	▬	19	▬
WLCMRD08SDBH4SS	31	04/18/2008	0-30	24	▲	37,000	▲	25	▲
WLCMRD08SDBH5SS	100	04/17/2008	0-30	31	▲	10,000	▬	14	▬
WR-WSI98SD061	88	09/21/1997	0-10	38	▲	4,300	▼	--	--
PDI-SG-B178-BL1	**--**	**04/14/2018**	**0-27**	**2**	**--**	**203,940**	**--**	**343**	**--**
LW2-G264	95	08/30/2004	0-30	5	▲	1,700,000	▲	100	▼
WR-WSI98SD062	91	09/20/1997	0-10	--	--	750,000	▲	--	--
PDI-SG-B179-BL1	**--**	**06/01/2018**	**0-23**	**84**	**--**	**727,900**	**--**	**122**	**--**
LW2-G270	91	07/21/2004	0-29	4	▼	230,000	▼	39	▼
LW2-G273	35	10/07/2004	0-28	190	▲	160,000	▼	56	▼
LW2-G274	44	10/29/2004	0-22	3	▼	190,000	▼	73	▼
LWG0106B025SDS015C00	69	10/14/2002	0-15	53	▼	460,000	▼	200	▲
PDI-SG-B181-BL1	**--**	**06/02/2018**	**0-30**	**24**	**--**	**51,050**	**--**	**44**	**--**
DGS-11SC	94	10/06/2010	0-30.5	65	▲	240,000	▲	49	▬
LW2-G270	100	07/21/2004	0-29	4	▼	230,000	▲	39	▬
LW2-G270-2	85	07/21/2004	0-29	4	▼	370,000	▲	190	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B182-BL1	**--**	**06/01/2018**	**0-25**	**58**	**--**	**642,260**	**--**	**237**	**--**
GS-04-A-PG	33	12/01/2005	0-26	--	--	1,100,000	▲	--	--
GS-04-A-PG-2	42	12/01/2005	0-26	--	--	2,400,000	▲	--	--
LW2-G283	24	08/30/2004	0-27	4	▼	2,100,000	▲	560	▲
WR-WSI98SD063	38	09/20/1997	0-10	--	--	85,000	▼	--	--
PDI-SG-B183-BL1	**--**	**05/31/2008**	**0-18**	**9**	**--**	**28,640**	**--**	**1.4**	**--**
LW2-G261	43	08/19/2004	0-25	2	▼	480	▼	--	--
PDI-SG-B184-BL1	**--**	**04/18/2018**	**0-25**	**2**	**--**	**1,895**	**--**	**0.5**	**--**
LW3-G660	53	12/03/2007	0-23	11	▲	2,300	▲	1	▲
PDI-SG-B185-BL1	**--**	**04/18/2018**	**0-24**	**8**	**--**	**5,731**	**--**	**1.2**	**--**
LWG0106R040SDS015C00	56	10/28/2002	0-15	71	▲	100,000	▲	5	▲
PDI-SG-B186-BL1	**--**	**06/01/2018**	**0-20**	**2**	**--**	**34,320**	**--**	**16**	**--**
DGS-22SC	41	10/12/2010	0-30.5	33	▲	36,000	▬	130	▲
GS-07-B-PG	92	12/01/2005	0-24	--	--	500,000	▲	--	--
LW2-G294	58	07/21/2004	0-26	97	▲	1,300,000	▲	920	▲
LW2-G294-2	71	07/21/2004	0-29	77	▲	890,000	▲	262	▲
PDI-SG-B187-BL1	**--**	**06/01/2018**	**0-30**	**3**	**--**	**60,810**	**--**	**45**	**--**
DGS-21	71	04/19/2011	0-27.5	19	▲	92,000	▲	19	▼
GS-07-D-PG	57	12/01/2005	0-30	--	--	130,000	▲	--	--
LW2-G289	62	08/19/2004	0-27	--	--	220,000	▲	--	--
LW2-G294	98	07/21/2004	0-26	97	▲	1,300,000	▲	920	▲
LW2-G294-2	85	07/21/2004	0-29	77	▲	890,000	▲	262	▲
WR-WSI98SD067	88	09/21/1997	0-10	--	--	310,000	▲	--	--
PDI-SG-B188-BL1	**--**	**05/31/2018**	**0-21**	**0.6**	**--**	**16**	**--**	**0.9**	**--**
LW2-G271	21	08/19/2004	0-26	2	▲	94	▲	1	▬

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B189-BL1	**--**	**06/02/2018**	**0-30**	**13**	**--**	**21,509**	**--**	**33**	**--**
DGS-24SC	17	10/12/2010	0-30.5	32	▲	190,000	▲	130	▲
LW2-G301	35	09/13/2004	0-27	21	▲	1,300,000	▲	126	▲
LW3-GCRSP06W	64	10/17/2007	0-18	12	▬	35,000	▲	24	▼
WLCGSD01AN0101	98	04/10/2001	0-10	--	--	230,000	▲	--	--
WLCGSD01AN0102	97	04/10/2001	0-10	--	--	620,000	▲	--	--
WLCGSD01AN0103	88	04/10/2001	0-10	--	--	1,800,000	▲	--	--
WR-WSI98SD068	70	09/21/1997	0-10	--	--	150,000	▲	--	--
PDI-SG-B192-BL1	**--**	**05/31/2018**	**0-8**	**--**	**--**	**6,209**	**--**	**--**	**--**
SL-04-A-PG	38	11/29/2005	0-20	--	--	9,900	▲	--	--
SL-05-A-PG	84	11/29/2005	0-26	--	--	5,100	▬	--	--
PDI-SG-B193-BL1	**--**	**05/31/2018**	**0-30**	**7**	**--**	**11,772**	**--**	**26**	**--**
LW2-G311	49	07/21/2004	0-21	190	▲	82,000	▲	1,700	▲
LW2-G311-2	71	07/21/2004	0-22	52	▲	13,000	▬	95	▲
SL-05-A-PG	4	11/29/2005	0-26	--	--	5,100	▼	--	--
PDI-SG-B194-BL1	**--**	**06/01/2018**	**0-5**	**--**	**--**	**67**	**--**	**--**	**--**
LW2-G300	94	08/20/2004	0-26	--	--	58	▬	--	--
PDI-SG-B196-BL1	**--**	**04/14/2018**	**0-30**	**60**	**--**	**106,970**	**--**	**46**	**--**
DGS-53	23	04/20/2011	0-24	19	▼	66,000	▼	13	▼
WLCASF97S016	90	06/10/1997	0-10	--	--	4,800	▼	--	--
PDI-SG-B198-BL1	**--**	**04/14/2018**	**0-30**	**24**	**--**	**7,656**	**--**	**105**	**--**
LW2-G314	88	08/20/2004	0-28	27	▬	7,100	▬	32	▼
LW2-G315	94	09/13/2004	0-28	4	▼	7,300	▬	160	▲
PDI-SG-B199-BL1	**--**	**04/14/2018**	**0-30**	**17**	**--**	**14,937**	**--**	**89**	**--**
WLCDRD05PG058	33	05/25/2005	0-26	96	▲	15,000	▬	220	▲
WR-WSI98SD075	89	09/20/1997	0-10	--	--	29,000	▲	170	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B201-BL1	**--**	**05/29/2018**	**0-29**	**9**	**--**	**1,646**	**--**	**17**	**--**
LW2-G321	63	08/25/2004	0-27	133	▲	4,800	▲	9	▼
WLCDRD05PG060	66	05/25/2005	0-20	330	▲	700	▼	47	▲
PDI-SG-B204-BL1	**--**	**04/19/2018**	**0-30**	**--**	**--**	**317**	**--**	**--**	**--**
WLCMBA01ED0104	61	01/05/2001	0-38	--	--	610	▲	--	--
WLCMBA01ED0105	78	01/05/2001	0-38	--	--	714	▲	--	--
PDI-SG-B205-BL1	**--**	**04/19/2018**	**0-22**	**83**	**--**	**3,517**	**--**	**8**	**--**
LW2-G322	41	08/23/2004	0-21	200	▲	56,000	▲	42	▲
LW2-G325	91	08/20/2004	0-21	21	▼	5,200	▲	11	▲
RP-03-C-PG	86	12/01/2005	0-24	--	--	2,900	▬	7	▬
PDI-SG-B206-BL1	**--**	**04/18/2018**	**0-24**	**3**	**--**	**281**	**--**	**4**	**--**
LW2-G332	97	08/26/2004	0-29	480	▲	2,400	▲	65	▲
PDI-SG-B207-BL1	**--**	**05/29/2018**	**0-21**	**15**	**--**	**351**	**--**	**139**	**--**
LW2-G335	39	09/14/2004	0-26	48	▲	4,600	▲	500	▲
R2-RP-03-PG	30	12/02/2005	0-28	--	--	140	▼	1,000	▲
WLCOFJ0222B03	89	10/16/2002	0-9	--	--	3,100	▲	470	▲
WR-WSI98SD078	71	09/21/1997	0-10	--	--	3,500	▲	430	▲
PDI-SG-B209-BL1	**--**	**05/17/2018**	**0-17**	**18**	**--**	**429**	**--**	**139**	**--**
LW2-B050	98	11/05/2004	0-15	84	▲	250	▼	251	▲
PDI-SG-B210-BL1	**--**	**05/20/2018**	**0-27**	**--**	**--**	**229**	**--**	**--**	**--**
WLCMBA01ED0119	81	01/08/2001	0-38	--	--	165	▼	--	--
PDI-SG-B215-BL1	**--**	**05/20/2018**	**0-30**	**--**	**--**	**228**	**--**	**--**	**--**
WLCMBA01ED0125	84	01/08/2001	0-38	--	--	1,200	▲	--	--
PDI-SG-B216-BL1	**--**	**04/19/2018**	**0-27**	**89**	**--**	**641**	**--**	**895**	**--**
LW2-G345	97	07/22/2004	0-27	35	▼	850	▲	760	▬

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B217-BL1	--	**05/20/2018**	**0-30**	--	--	**297**	--	--	--
WLCMBJ99D09932	41	10/15/1999	0-15	--	--	480	▲	--	--
PDI-SG-B218-BL1	--	**04/19/2018**	**0-30**	**40**	--	**28,511**	--	**386**	--
LW2-G350	48	09/14/2004	0-29	132	▲	13,000	▼	1,300	▲
WLRELF99OSS001	73	01/19/1999	0-10	--	--	2,600	▼	1,400	▲
WR-WSI98SD090	15	09/22/1997	0-10	4,000	▲	4,100	▼	2,400	▲
PDI-SG-B219-BL1	--	**04/19/2018**	**0-27**	**166**	--	**2,676**	--	**28,831**	--
LW2-B018	42	07/30/2004	0-15	190	▬	150	▼	490	▼
PDI-SG-B223-BL1	--	**04/19/2018**	**0-30**	--	--	**4,206**	--	**1,269**	--
R2-AP-02-PG	13	11/30/2005	0-29	--	--	2,100	▼	1,600	▲
PDI-SG-B225-BL1	--	**05/17/2018**	**0-30**	**15**	--	**2,192**	--	**10,971**	--
LW2-C356	86	11/09/2004	0-30	45	▲	--	--	--	--
LW2-G356	79	08/26/2004	0-29	--	--	830	▼	270	▼
WLCDRD05PG072	64	05/25/2005	0-28	96	▲	1,000	▼	950	▼
PDI-SG-B226-BL1	--		**0-29**	**9**	--	**366**	--	**3**	--
LW2-G342	24	10/11/2004	0-24	26	▲	970	▲	3	▬
PDI-SG-B230-BL1	--		**0-30**	**9**	--	**511**	--	**15**	--
CP-09-D-PG	37	11/30/2005	0-30	--	--	240	▼	56	▲
LW2-G368	58	10/08/2004	0-26	22	▲	490	▬	36	▲
PDI-SG-B232-BL1	--		**0-24**	**8**	--	**278**	--	**20**	--
LWG0107R030SDS015C00	65	11/05/2002	0-15	27	▲	520	▲	27	▲
WLCASF97S013	53	06/11/1997	0-10	--	--	490	▲	--	--
WR-WSI98SD100	38	09/22/1997	0-10	--	--	460	▲	--	--
PDI-SG-B233-BL1	--		**0-22**	**5**	--	**1,396**	--	--	--
WR-WSI98SD106	60	09/22/1997	0-10	39	▲	260	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B239-BL1	--		**0-30**	**14**	--	**910**	--	**8**	--
WLCASF97S009	98	06/11/1997	0-10	--	--	1,400	▲	--	--
WLCCWI08DMMU1A	73	09/02/2008	0-2	19	▲	--	--	--	--
WLCCWI08DMMU3A	78	09/08/2008	0-2	19	▲	--	--	--	--
WLCWTG02ANCTPD01	61	07/16/2002	0-15	115	▲	1,650	▲	23	▲
PDI-SG-B240-BL1	--		**0-26**	**11**	--	**409**	--	--	--
WR-WSI98SD111	67	09/22/1997	0-10	40	▲	340	▬	--	--
PDI-SG-B245-BL1	--		**0-22**	**3**	--	**308**	--	**2**	--
LW2-G399	79	08/27/2004	0-22	38	▲	2,300	▲	12	▲
PDI-SG-B246-BL1	--		**0-30**	**7**	--	**672**	--	**3**	--
LW2-G403	18	10/22/2004	0-26	2	▼	210	▼	2	▼
PDI-SG-B249-BL1	--		**0-30**	**122**	--	**291**	--	**2**	--
LW3-G696	93	11/30/2007	0-30	20	▼	370	▲	7	▲
PDI-SG-B251-BL1	--		**0-30**	**11**	--	**734**	--	**5**	--
LW2-G407	41	09/09/2004	0-29	100	▲	340	▼	5	▬
PDI-SG-B252-BL1	--		**0-26**	**25**	--	**512**	--	--	--
PSYSEA98PSY24	59	04/03/1998	0-10	41	▲	1,500	▲	--	--
PDI-SG-B253-BL1	--		**0-24**	**16**	--	**436**	--	**0.9**	--
LW2-G413	20	10/22/2004	0-27	56	▲	120	▼	1	▬
WLCASF97S001	66	06/12/1997	0-10	--	--	730	▲	--	--
WR-WSI98SD123	71	09/24/1997	0-10	--	--	340	▼	--	--
PDI-SG-B254-BL1	--		**0-30**	**53**	--	**1,950**	--	--	--
PSYSEA98PSY21	96	04/03/1998	0-10	94	▲	2,400	▲	--	--
PDI-SG-B259-BL1	--		**0-30**	**165**	--	**7,263**	--	--	--
PSYSEA98PSY33	83	04/02/1998	0-10	10	▼	500	▼	--	--
WR-WSI98SD130	72	09/23/1997	0-10	39	▼	390	▼	--	--

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B263-BL1	--		**0-29**	**144**	--	**2,870**	--	--	--
PSYSEA98PSY15	75	04/04/1998	0-10	140	▬	3,100	▬	--	--
PDI-SG-B266-BL1	--		**0-29**	**19**	--	**423**	--	--	--
PSYSEA98PSY43	83	04/01/1998	0-10	10	▼	320	▼	--	--
PDI-SG-B268-BL1	--		**0-30**	--	--	**564**	--	--	--
WR-WSI98SD131	100	09/24/1997	0-10	--	--	520	▬	--	--
PDI-SG-B273-BL1	--		**0-27**	**321**	--	**2,000**	--	**8**	--
LW2-G379	82	09/09/2004	0-28	420	▲	1,500	▼	10	▲
PDI-SG-B277-BL1	--		**0-21**	**20**	--	**683**	--	**6**	--
WR-WSI98SD137	74	09/24/1997	0-10	38	▲	510	▼	4	▼
PDI-SG-B278-BL1	--		**0-28**	**13**	--	**356**	--	**2**	--
LW2-G419	91	08/27/2004	0-27	39	▲	220	▼	3	▲
PDI-SG-B280-BL1	--		**0-29**	**289**	--	**1,903**	--	--	--
PSYSEA98PSY11	64	04/05/1998	0-10	380	▲	3,000	▲	--	--
PDI-SG-B285-BL1	--		**0-30**	**8**	--	**329**	--	**4**	--
LW2-G424	65	10/08/2004	0-28	15	▲	200	▼	32	▲
PDI-SG-B290-BL1	--		**0-30**	**20**	--	**417**	--	**6**	--
LW2-C447	38	10/06/2004	0-30	--	--	--	--	11	▲
LW2-G447	36	08/31/2004	0-25	50	▲	240	▼	--	--
PDI-SG-B291-BL1	--		**0-30**	--	--	**1,164**	--	--	--
WR-WSI98SD140	10	09/24/1997	0-10	--	--	660	▼	--	--

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B298-BL1	**--**		**0-23**	**64**	**--**	**354**	**--**	**28**	**--**
LW2-G455	14	08/25/2004	0-24	990	▲	860	▲	41	▲
WLCOFH021805	88	08/21/2002	0-15	251	▲	3,900	▲	120	▲
WLCOFH021806	88	08/21/2002	0-15	650	▲	4,300	▲	210	▲
WLCOFH021807	47	08/21/2002	0-15	489	▲	1,100	▲	181	▲
WLCOFH021809	83	08/20/2002	0-15	174	▲	600	▲	142	▲
WR-WSI98SD143	80	09/24/1997	0-10	--	--	770	▲	--	--
PDI-SG-B299-BL1	**--**		**0-30**	**43**	**--**	**497**	**--**	**11**	**--**
LW2-G453	73	08/31/2004	0-26	35,000	▲	5,700	▲	3,930	▲
LW2-GBT028	42	12/08/2005	0-10	1,500	▲	1,000	▲	88	▲
WLCOFH021810	85	08/20/2002	0-15	108	▲	200	▼	91	▲
WR-WSI98SD144	96	09/24/1997	0-10	--	--	630	▲	--	--
PDI-SG-B300-BL1	**--**		**0-30**	**4**	**--**	**112**	**--**	**4**	**--**
LW2-G443	67	08/24/2004	0-26	4	▬	110	▬	2	▼
PDI-SG-B301-BL1	**--**		**0-25**	**13**	**--**	**366**	**--**	**7**	**--**
LW2-G433	37	09/09/2004	0-26	40	▲	520	▲	3	▼
LW2-G433-2	16	09/09/2004	0-27	41	▲	650	▲	4	▼
LW2-GBT027-1	83	12/06/2005	0-10	44	▲	295	▬	4	▼
PDI-SG-B305-BL1	**--**		**0-30**	**13**	**--**	**289**	**--**	**3**	**--**
LW2-G457	65	08/31/2004	0-27	110	▲	2,700	▲	13	▲
PDI-SG-B307-BL1	**--**		**0-25**	**40**	**--**	**1,120**	**--**	**8**	**--**
LW2-G438	65	08/27/2004	0-26	13	▼	710	▼	4	▼
PDI-SG-B309-BL1	**--**		**0-30**	**18**	**--**	**882**	**--**	**4**	**--**
LW2-G461	13	08/31/2004	0-27	66	▲	240	▼	8	▲
PDI-SG-B310-BL1	**--**		**0-28**	**19**	**--**	**744**	**--**	**5**	**--**
LW2-G461	51	08/31/2004	0-27	66	▲	240	▼	8	▲

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B312-BL1	--		**0-25**	**14**	--	**138**	--	**2**	--
LW2-G442	99	08/27/2004	0-27	54	▲	300	▲	3	▲
PDI-SG-B314-BL1	--		**0-20**	**3**	--	**130**	--	**0.6**	--
LW2-G446	49	09/01/2004	0-28	110	▲	210	▲	5	▲
PDI-SG-B320-BL1	--		**0-20**	**10**	--	**93**	--	**1.3**	--
LW2-G451	75	09/01/2004	0-27	45	▲	320	▲	2	▲
PDI-SG-B322-BL1	--		**0-30**	**6**	--	**170**	--	**5**	--
LW2-G479	6	08/31/2004	0-27	27	▲	160	▬	4	▬
PDI-SG-B325-BL1	--		**0-30**	**7**	--	**737**	--	**6**	--
LW2-GBT030	75	12/09/2005	0-10	61	▲	810	▬	10	▲
PDI-SG-B328-BL1	--		**0-29**	**10**	--	**527**	--	**2**	--
LW2-G465	58	09/01/2004	0-26	32	▲	50	▼	2	▲
PDI-SG-B331-BL1	--		**0-30**	**16**	--	**1,001**	--	**4**	--
LW2-GBT031	37	12/09/2005	0-10	8	▼	170	▼	2	▼
PDI-SG-B336-BL1	--		**0-30**	**8**	--	**219**	--	**2**	--
LW2-G476	59	09/01/2004	0-27	110	▲	130	▼	2	▬
PDI-SG-B337-BL1	--		**0-28**	**12**	--	**567**	--	**1.3**	--
LW3-G740	75	11/16/2007	0-27	250	▲	810	▲	13	▲
PDI-SG-B338-BL1	--		**0-27**	**14**	--	**506**	--	**2**	--
LW3-G740	91	11/16/2007	0-27	250	▲	810	▲	13	▲
PDI-SG-B339-BL1	--		**0-27**	**5**	--	**254**	--	**2**	--
LWG0109R041SDS015C00	66	10/28/2002	0-15	65	▲	360	▲	5	▲
PDI-SG-B340-BL1	--		**0-28**	**26**	--	**1,562**	--	**4**	--
PSYSEA98PSY70	53	04/07/1998	0-10	10	▼	360	▼	6	▲
PDI-SG-B341-BL1	--		**0-25**	**4**	--	**159**	--	**1.5**	--
LW2-G481	86	09/02/2004	0-26	11	▲	57	▼	2	▲

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B344-BL1	--		**0-29**	**4**	--	**203**	--	**3**	--
LW2-G493	54	09/03/2004	0-28	18	▲	160	▼	4	▬
PDI-SG-B347-BL1/PDI-SG-B347-BL1-D	--		**0-30**	**11**	--	**176**	--	**3**	--
WLCDRD05PG043	93	05/24/2005	0-30	26	▲	79	▼	3	▬
PDI-SG-B353-BL1	--		**0-30**	**7**	--	**258**	--	**3**	--
LW3-G746	50	11/26/2007	0-30	37	▲	160	▼	7	▲
PDI-SG-B355-BL1	--		**0-28**	**8**	--	**1,239**	--	**3**	--
LW2-G495	36	09/02/2004	0-30	26	▲	2,000	▲	6	▲
PDI-SG-B359-BL1	--		**0-30**	**--**	--	**408**	--	**--**	--
WLCGAL00GAPD01	100	12/21/2000	0-30	--	--	1,700	▲	--	--
PDI-SG-B362-BL1	--		**0-23**	**148**	--	**1,509**	--	**6**	--
LW3-GCA10W	49	11/20/2007	0-17	58	▼	940	▼	10	▲
LW3-GCR10W	57	10/17/2007	0-19	73	▼	5,000	▲	12	▲
WLCT1F00T1S01	48	06/22/2000	0-10	71	▼	390	▼	6	▬
PDI-SG-B364-BL1	--		**0-30**	**8**	--	**368**	--	**3**	--
LW2-G500	98	09/03/2004	0-26	30	▲	6,800	▲	4	▲
PDI-SG-B367-BL1	--		**0-30**	**--**	--	**601**	--	**--**	--
WLCSPL03SED05	90	12/22/2003	0-15	--	--	840	▲	--	--
WLCSPL03SED07	69	12/22/2003	0-15	--	--	510	▬	--	--
PDI-SG-B371-BL1	--		**0-30**	**4**	--	**472**	--	**3**	--
LW3-G763	72	11/26/2007	0-30	20	▲	540	▬	4	▬
WLCDRD05PG112	69	05/23/2005	0-30	59	▲	160	▼	10	▲
PDI-SG-B372-BL1	--		**0-30**	**13**	--	**188**	--	**3**	--
LW2-G505	56	09/03/2004	0-22	22	▲	640	▲	5	▲
PDI-SG-B373-BL1	--		**0-28**	**9**	--	**201**	--	**3**	--
LW2-G507	23	09/03/2004	0-20	42	▲	160	▼	2	▼

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B374-BL1	--		**0-30**	**4**	--	**262**	--	**3**	--
LW2-G510	40	09/03/2004	0-29	19	▲	260	▬	6	▲
PDI-SG-B377-BL1	--		**0-30**	**4**	--	**275**	--	**4**	--
LW3-G765	29	12/04/2007	0-30	15	▲	260	▬	3	▼
PDI-SG-B382-BL1	--		**0-30**	**3**	--	**186**	--	**4**	--
WLCDRD05PG118	58	05/23/2005	0-30	29	▲	73	▼	3	▼
WLCT1F00T1S02	54	06/22/2000	0-10	20	▲	20	▼	5	▲
PDI-SG-B383-BL1	--		**0-30**	**5**	--	**383**	--	**5**	--
LW2-G517	38	09/03/2004	0-29	43	▲	560	▲	5	▬
WLCT1F00T1S04	88	06/22/2000	0-10	52	▲	220	▼	5	▬
PDI-SG-B385-BL1	--		**0-30**	**8**	--	**248**	--	**3**	--
WLCDRD05PG061	48	05/23/2005	0-30	29	▲	350	▲	6	▲
PDI-SG-B388-BL1	--		**0-30**	**34**	--	**3,942**	--	**3**	--
PSYSEA98PSY72	32	04/07/1998	0-10	45	▲	767	▼	7	▲
PDI-SG-B389-BL1	--		**0-19**	**92**	--	**3,093**	--	**6**	--
WLCDRD05PG063	20	05/23/2005	0-24	200	▲	1,300	▼	19	▲
PDI-SG-B390-BL1	--		**0-30**	**6**	--	**428**	--	**5**	--
LW2-G518	31	09/03/2004	0-25	31	▲	4,300	▲	15	▲
WLCT1F00T1S06	64	06/22/2000	0-10	20	▲	20	▼	5	▬
PDI-SG-B392-BL1	--		**0-20**	**67**	--	**--**	--	**--**	--
RM11E-G001	26	05/05/2009	0-27	72	▬	--	--	--	--
PDI-SG-B393-BL1	--		**0-30**	**4**	--	**554**	--	**6**	--
WLCT1F00T1S08	84	06/22/2000	0-10	20	▲	200	▼	5	▬
PDI-SG-B396-BL1	--		**0-14**	**1.4**	--	**--**	--	**0.9**	--
RM11E-G003	30	05/13/2009	0-30	8	▲	--	--	1	▬
RM11E-G004	77	05/05/2009	0-15	10	▲	--	--	--	--

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PDI-SG-B398-BL1	--		**0-19**	**29**	--	**266**	--	**4**	--
RM11E-G008	18	05/06/2009	0-17	35	▬	1,800	▲	2	▼
RM11E-G009	100	05/06/2009	0-17	2,900	▲	--	--	--	--
PDI-SG-B399-BL1	--		**0-15**	**5**	--	--	--	--	--
RM11E-G014	92	05/06/2009	0-22	12	▲	--	--	--	--
PDI-SG-B400-BL1	--		**0-30**	**8**	--	**181**	--	**3**	--
RM11E-C012	82	05/20/2009	0-30	109	▲	640	▲	53	▲
RM11E-G018	92	05/07/2009	0-25	22	▲	330	▲	4	▲
PDI-SG-B404-BL1	--		**0-9**	**46**	--	**446**	--	**4**	--
RM11E-G018	84	05/07/2009	0-25	22	▼	330	▼	4	▬
RM11E-G019	50	06/16/2009	0-23	110	▲	--	--	--	--
PDI-SG-B405-BL1	--		**0-12**	**424**	--	**880**	--	**7**	--
LW3-GCA11E	40	12/06/2007	0-24	6,600	▲	410	▼	460	▲
RM11E-G026	73	05/08/2009	0-17	1,400	▲	2,800	▲	79	▲
RM11E-G027	98	05/08/2009	0-22	140	▼	--	--	6	▬
RM11E-G067	27	06/15/2009	0-26	56	▼	220	▼	11	▲
PDI-SG-B408-BL1	--		**0-22**	**1,854**	--	**310**	--	**2**	--
LW3-G779	51	12/05/2007	0-23	200	▼	30	▼	17	▲
RM11E-G033	88	05/13/2009	0-25	2,000	▬	240	▼	49	▲
PDI-SG-B411-BL1	--		**0-30**	**3**	--	**130**	--	**4**	--
WLCDRD05PG132	21	05/23/2005	0-30	31	▲	190	▲	4	▬
PDI-SG-B414-BL1	--		**0-10**	**62**	--	**904**	--	--	--
RM11E-G046	83	06/15/2009	0-19	26	▼	--	--	--	--
WLCPGH02CLDP	37	08/29/2002	0-30	51	▬	280	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-B430	--		**0-29**	**4**	--	**270**	--	**2**	--
GCR12W	36	10/18/2007	0-12	7	▲	190	▼	7	▲
LW3-UG05	86		0-27	21	▲	870	▲	3	▲
PDI-SG-B431	--		**0-29**	**10**	--	**105**	--	**0.7**	--
G780	55	12/05/2007	0-30	46	▲	420	▲	10	▲
LW3-UG07	31		0-25	200	▲	3,400	▲	16	▲
WLLPGH09PGC-09	72	08/19/2009	0-30	--	--	580	▲	--	--
WLLPGH09PGC-11	58	08/20/2009	0-30	--	--	1,300	▲	--	--
PDI-SG-S001	--		**0-26**	**24**	--	**267**	--	**2**	--
LW2-G004	60	07/19/2004	0-27	51	▲	310	▬	5	▲
LW2-GBT001	66	12/19/2005	0-10	47	▲	340	▲	3	▲
PDI-SG-S004	--		**0-27**	**427**	--	**1,115**	--	**4**	--
LW3-G600	85	11/28/2007	0-29	43	▼	460	▼	6	▲
PDI-SG-S005	--		**0-30**	**76**	--	**821**	--	**5**	--
LW3-G600	74	11/28/2007	0-29	43	▼	460	▼	6	▬
PDI-SG-S006	--		**0-27**	**71**	--	**965**	--	**5**	--
LW2-G010	60	07/19/2004	0-27	220	▲	610	▼	9	▲
LW2-G011	74	07/19/2004	0-25	1,900	▲	1,900	▲	23	▲
PDI-SG-S010	--		**0-23**	**250**	--	**773**	--	**0.9**	--
LWG0102R015SDS015C00	56	10/16/2002	0-15	1,400	▲	2,400	▲	26	▲
PDI-SG-S011	--		**0-20**	**817**	--	**5,913**	--	**3**	--
LWG0102R001SDS015C00	41	10/24/2002	0-15	540	▼	2,600	▼	18	▲
PDI-SG-S012	--		**0-30**	**1,595**	--	**5,479**	--	**7**	--
LWG0102R001SDS015C00	36	10/24/2002	0-15	540	▼	2,600	▼	18	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S017	--		**0-24**	**29**	--	**424**	--	**1**	--
LW2-G035	61	07/26/2004	0-28	89	▲	1,100	▲	8	▲
LW2-G038	52	09/08/2004	0-26	62	▲	590	▲	3	▲
PDI-SG-S019	--		**0-29**	**13**	--	**2,122**	--	**9**	--
LW2-G039	96	07/23/2004	0-29	27	▲	510	▼	6	▼
LW3-G609	48	11/28/2007	0-25	120	▲	240,000	▲	49	▲
PDI-SG-S021	--		**0-30**	**28**	--	**3,086**	--	**12**	--
LW2-G066	78	07/20/2004	0-29	21	▼	1,300	▼	46	▲
LWG0103R002SDS015C00	36	10/18/2002	0-15	26	▬	3,100	▬	250	▲
PDI-SG-S023	--		**0-27**	**38**	--	**499**	--	**5**	--
LW3-G614	33	11/27/2007	0-30	220	▲	610	▲	28	▲
PDI-SG-S027	--		**0-30**	**562**	--	**652**	--	**6**	--
LW2-C087	75	10/21/2005	0-30	--	--	--	--	6	▬
LW2-G083	46	07/28/2004	0-24	81	▼	660	▬	5	▬
PDI-SG-S030	--		**0-23**	**322**	--	**3,892**	--	**12**	--
LW2-G093	62	10/21/2004	0-25	2,200	▲	5,600	▲	58	▲
PDI-SG-S031	--		**0-30**	**707**	--	**2,443**	--	**--**	--
WLCITG08SED08	93	07/11/2008	0-15	160	▼	880	▼	--	--
WLCITG08SED09	70	07/11/2008	0-15	510	▼	3,000	▲	--	--
PDI-SG-S032	--		**0-23**	**47**	--	**295**	--	**--**	--
WLCITG08SED05	22	07/11/2008	0-15	200	▲	1,900	▲	--	--
WLCITG08SED11	100	07/24/2008	0-15	590	▲	3,900	▲	--	--
PDI-SG-S035	--		**0-24**	**132**	--	**39,990**	--	**19**	--
LW2-C096	38	10/24/2005	0-30	--	--	3,200	▼	--	--
LW2-G096	78	08/03/2004	0-25	260	▲	980	▼	26	▲
WR-WSI98SD013	68	09/18/1997	0-10	--	--	990	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S038	--		**0-24**	**4**	--	**17,510**	--	**3**	--
LW3-G619	77	11/27/2007	0-21	42	▲	50,000	▲	3	▬
PDI-SG-S039	--		**0-23**	**20**	--	**41,180**	--	**33**	--
LW3-G619	28	11/27/2007	0-21	42	▲	50,000	▲	3	▼
PDI-SG-S040	--		**0-30**	**66**	--	**553**	--	**13**	--
LW2-C106	75	10/25/2005	0-30	57	▬	440	▼	9	▼
PDI-SG-S041	--		**0-30**	**26**	--	**684**	--	**6**	--
LW2-C109	72	10/25/2005	0-30	72	▲	1,200	▲	7	▲
LW2-G109	80	08/03/2004	0-28	220	▲	500	▼	6	▬
PDI-SG-S043	--		**0-30**	**63**	--	**550**	--	**5**	--
LW2-C111-2	46	11/03/2004	0-30	300	▲	--	--	--	--
LW2-G111	66	07/28/2004	0-24	1,700	▲	1,000	▲	11	▲
PDI-SG-S044	--		**0-30**	**629**	--	**8,385**	--	**40**	--
LWG0103R004SDS015C10	65	10/18/2002	0-15	700	▬	1,700	▼	7	▼
LWG0103R004SDS015C20	71	10/18/2002	0-15	270	▼	1,100	▼	6	▼
LWG0103R004SDS015C30	70	10/18/2002	0-15	130	▼	870	▼	5	▼
WLCT4C04VC01	28	03/16/2004	0-30	280	▼	2,500	▼	30	▼
PDI-SG-S046	--		**0-30**	**10**	--	**7,790**	--	**11**	--
LW2-G127	96	08/09/2004	0-26	19	▲	11,000	▲	22	▲
WLCGXV99S3	41	10/08/1999	0-30	274	▲	30,700	▲	41	▲
PDI-SG-S047	--		**0-30**	**6**	--	**2,080**	--	**12**	--
WLCDRD05PG016	93	05/26/2005	0-23	44	▲	33,000	▲	13	▬
WR-WSI98SD024	38	09/17/1997	0-10	--	--	1,300	▼	--	--
PDI-SG-S049	--		**0-30**	**11**	--	**965**	--	**5**	--
WLCT4C04VC05	100	03/16/2004	0-30	60	▲	5,600	▲	13	▲

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S050	**--**		**0-28**	**20**	**--**	**2,358**	**--**	**6**	**--**
WLCT4C04VC06	37	03/16/2004	0-30	70	▲	10,000	▲	16	▲
PDI-SG-S051	**--**		**0-27**	**15**	**--**	**2,101**	**--**	**6**	**--**
WLCT4C04VC08	86	03/17/2004	0-30	82	▲	11,000	▲	11	▲
WR-WSI98SD022	28	09/18/1997	0-10	--	--	11,000	▲	--	--
PDI-SG-S052	**--**		**0-28**	**73**	**--**	**27,068**	**--**	**9**	**--**
LW2-GBT008	82	12/14/2005	0-10	69	▬	9,600	▼	19	▲
LWG0104R003SDS015C00	71	10/24/2002	0-15	50	▼	12,000	▼	4	▼
WLCOFJ0252C05	75	10/15/2002	0-15	--	--	14,000	▼	23	▲
WLCT4C04VC16	75	03/17/2004	0-30	150	▲	56,000	▲	22	▲
PDI-SG-S053	**--**		**0-22**	**--**	**--**	**4,680**	**--**	**18**	**--**
WLCOFJ022402	37	10/22/2002	0-10	--	--	18,000	▲	31	▲
WLCOFJ022404	50	10/22/2002	0-15	--	--	3,000	▼	26	▲
PDI-SG-S054	**--**		**0-30**	**7**	**--**	**1,360**	**--**	**5**	**--**
LW2-B011	75	07/28/2004	0-15	2	▼	7	▼	1	▼
WLCT4C04VC19	76	03/10/2004	0-30	67	▲	36,000	▲	8	▲
WLCT4G06T4WB02	98	07/20/2006	0-15	--	--	1,700	▲	--	--
PDI-SG-S055	**--**		**0-25**	**--**	**--**	**13,897**	**--**	**--**	**--**
WLCT4G06T4WB01	91	07/20/2006	0-15	--	--	3,800	▼	--	--
WLCT4J98HCS41	71	10/15/1998	0-10	--	--	180,000	▲	--	--
WLCT4J98HCS42	4	10/12/1998	0-10	--	--	130,000	▲	--	--
PDI-SG-S057	**--**		**0-27**	**3**	**--**	**1,004**	**--**	**1.0**	**--**
WLCT4C04VC22	65	03/11/2004	0-30	10	▲	240	▼	--	--
WLCT4J98HCS32	73	10/12/1998	0-10	--	--	14,000	▲	--	--

Exhibit A
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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S058	**--**		**0-21**	**9**	**--**	**1,116**	**--**	**0.3**	**--**
WLCT4C04VC23	59	03/03/2004	0-30	34	▲	14,000	▲	8	▲
WLCT4J98HCS20	51	10/15/1998	0-10	--	--	170,000	▲	--	--
WLCT4J98HCS22	58	10/12/1998	0-10	--	--	48,000	▲	--	--
PDI-SG-S059	**--**		**0-30**	**10**	**--**	**15,943**	**--**	**5**	**--**
WLCT4J98HCS08	30	10/13/1998	0-10	--	--	96,000	▲	--	--
WLCT4L08T4IM02	30	12/30/2008	0-6	--	--	704	▼	--	--
WLCT4L08T4IM03	77	12/30/2008	0-15	--	--	21,600	▲	--	--
WLCT4L08T4IM04	51	12/30/2008	0-18	--	--	100,000	▲	--	--
WLCT4L08T4IMC02	50	12/30/2008	0-9	4	▼	--	--	1	▼
PDI-SG-S060	**--**		**0-30**	**8**	**--**	**18,641**	**--**	**16**	**--**
WLCT4C04VC29	96	03/05/2004	0-30	70	▲	50,000	▲	12	▼
WLCT4J98HCS06	96	10/13/1998	0-10	--	--	80,000	▲	--	--
WLCT4J98HCS13	29	10/12/1998	0-10	--	--	58,000	▲	--	--
PDI-SG-S062	**--**		**0-30**	**9**	**--**	**1,385**	**--**	**6**	**--**
LW2-G136	59	08/09/2004	0-27	54	▲	3,100	▲	7	▲
PDI-SG-S063	**--**		**0-27**	**8**	**--**	**4,524**	**--**	**6**	**--**
WLCDRD05PG024	84	05/26/2005	0-30	130	▲	7,900	▲	38	▲
PDI-SG-S065	**--**		**0-30**	**9**	**--**	**2,527**	**--**	**8**	**--**
AR-02-A-PG	87	11/29/2005	0-23	--	--	1,500	▼	--	--
LW2-G147	40	08/09/2004	0-24	150	▲	1,800	▼	13	▲
LWG0104B023SDS015C00	93	10/11/2002	0-15	17	▲	490	▼	4	▼

Exhibit A
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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S070	--		**0-30**	**5**	--	**2,575**	--	**10**	--
LW2-G177	86	08/11/2004	0-30	--	--	980	▼	--	--
LW2-G179	31	08/10/2004	0-24	3	▼	130,000	▲	140	▲
LW2-G182	96	08/10/2004	0-24	2	▼	2,800	▬	5	▼
WLCASF97S045	32	06/11/1997	0-10	--	--	12,500	▲	--	--
WR-WSI98SD046	39	09/19/1997	0-10	--	--	1,300	▼	--	--
PDI-SG-S077	--		**0-22**	**12**	--	**138,270**	--	**3**	--
LW3-G639	47	11/27/2007	0-24	38	▲	600,000	▲	29	▲
PDI-SG-S078	--		**0-23**	**5**	--	**1,377**	--	**5**	--
LW2-G200	56	10/21/2004	0-22	23	▲	2,300	▲	16	▲
WLCASF97S020	31	06/10/1997	0-10	--	--	3,100	▲	--	--
PDI-SG-S079	--		**0-24**	**31**	--	**6,562**	--	**6**	--
LW2-G192	95	10/21/2004	0-25	58	▲	3,200	▼	7	▲
LW3-GSP05E	67	10/16/2007	0-18	19	▼	3,200	▼	85	▲
PDI-SG-S080	--		**0-22**	**2**	--	**1,436**	--	**2**	--
LW2-G208	95	08/17/2004	0-26	28	▲	4,500	▲	9	▲
LW2-G210	97	10/21/2004	0-24	11	▲	350,000	▲	9	▲
LW2-G212	98	10/28/2004	0-20	43	▲	400	▼	1	▼
LW2-G212-2	56	10/28/2004	0-20	10	▲	850	▼	3	▲
LW2-G213	76	10/21/2004	0-24	3	▲	23,000	▲	6	▲
WLCASF97S018	58	06/12/1997	0-10	--	--	23,000	▲	--	--
PDI-SG-S083	--		**0-23**	**19**	--	**1,165,970**	--	**4**	--
LW2-G221	55	07/22/2004	0-27	11	▼	190,000	▼	11	▲
LW2-G223	24	08/17/2004	0-28	--	--	800,000	▼	--	--
LWG0105R040SDS015C00	30	10/28/2002	0-15	9	▼	460,000	▼	44	▲

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S084	--		**0-22**	**0.2**	--	**6,202**	--	**0.6**	--
LW2-G216	19	07/30/2004	0-28	2	▲	7,100	▬	4	▲
PDI-SG-S085	--		**0-20**	**124**	--	**11,054**	--	**18**	--
LW2-G207	36	09/07/2004	0-21	217	▲	8,100	▼	41	▲
LW2-G209	45	09/07/2004	0-14	210	▲	11,000	▬	11	▼
LWG0105R003SDS015C00	49	10/23/2002	0-15	420	▲	15,000	▲	19	▬
WLCMCB02SED01	73	02/08/2002	0-15	--	--	2,500	▼	--	--
PDI-SG-S086	--		**0-26**	**3**	--	**137,560**	--	**7**	--
LW2-G225	23	08/17/2004	0-20	27	▲	7,300,000	▲	148	▲
PDI-SG-S088	--		**0-30**	**29**	--	**6,111**	--	**11**	--
LW2-G214	58	07/19/2004	0-29	56	▲	4,300	▼	7	▼
LW2-G215	25	07/30/2004	0-25	61	▲	15,000	▲	59	▲
PDI-SG-S089	--		**0-10**	**22**	--	**7,497**	--	**8**	--
LW2-G215	91	07/30/2004	0-25	61	▲	15,000	▲	59	▲
PDI-SG-S092	--		**0-14**	**11**	--	**2,533**	--	**1.1**	--
LW2-G218	71	07/30/2004	0-21	250	▲	5,300	▲	5	▲
PDI-SG-S097	--		**0-16**	**17**	--	**2,409**	--	**7**	--
LW2-G232	91	08/30/2004	0-27	54	▲	8,100	▲	21	▲
LW3-G651	78	11/30/2007	0-30	130	▲	5,300	▲	18	▲
WLCOFJ025003	61	10/18/2002	0-13	--	--	8,400	▲	18	▲
WLCOFJ025004	94	10/18/2002	0-10	--	--	2,300	▬	12	▲
WLCOFJ025006	78	10/18/2002	0-15	--	--	3,400	▲	14	▲
PDI-SG-S098	--		**0-28.5**	**7**	--	**19,032**	--	**12**	--
LW2-GBT014	95	12/19/2005	0-10	16	▲	31,000	▲	37	▲
PDI-SG-S099	--		**0-22**	**63**	--	**5,669**	--	**65**	--
LW2-G236	87	07/30/2004	0-26	180	▲	6,300	▬	15	▼

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S100	--		**0-30**	**85**	--	**7,308**	--	**15**	--
LW2-G238	2	07/30/2004	0-29	150	▲	3,100	▼	14	▬
PDI-SG-S101	--		**0-30**	**8**	--	**5,064**	--	**17**	--
LW2-G251	65	08/12/2004	0-29	19	▲	22,000	▲	270	▲
LW2-G251-2	67	08/12/2004	0-29	21	▲	21,000	▲	46	▲
PDI-SG-S102	--		**0-27**	**10**	--	**10,357**	--	**11**	--
WLCMRD08SDDA18SS	17	04/18/2008	0-30	78	▲	34,000	▲	43	▲
PDI-SG-S103	--		**0-30**	**10**	--	**8,634**	--	**17**	--
WLCMRD08SDDA18SS	72	04/18/2008	0-30	78	▲	34,000	▲	43	▲
PDI-SG-S104	--		**0-26**	**158**	--	**6,884**	--	**8**	--
LW2-G243	98	07/30/2004	0-29	36	▼	390	▼	5	▼
PDI-SG-S106	--		**0-30**	**14**	--	**31,070**	--	**26**	--
DGS-03SC	73	10/05/2010	0-30.5	33	▲	200,000	▲	49	▲
DGS-04	71	04/20/2011	0-29	71	▲	92,000	▲	84	▲
LW2-C525	64	10/26/2005	0-30	250	▲	860,000	▲	88	▲
LW2-G259	5	08/12/2004	0-28	4	▼	200,000	▲	90	▲
WLCMRD08SDDA17SS	65	04/17/2008	0-30	22	▲	150,000	▲	37	▲
WLCMRD08SDUD27SS	99	04/14/2008	0-30	23	▲	210,000	▲	120	▲
PDI-SG-S107	--		**0-22**	**0.8**	--	**1,147**	--	**0.5**	--
DGS-48	33	04/20/2011	0-25	12	▲	41,300	▲	2	▲
LW2-G253	75	08/13/2004	0-27	2	▲	97,000	▲	8	▲
WLCT0I98GRAB05	22	09/14/1998	0-10	10	▲	620,000	▲	26	▲
PDI-SG-S108	--		**0-30**	**216**	--	**6,390**	--	**4**	--
LW2-G244	15	09/08/2004	0-29	200	▬	3,200	▼	8	▲
PDI-SG-S109	--		**0-22**	**12**	--	**101,980**	--	**13**	--
DGS-08	98	04/18/2011	0-25	20	▲	16,000	▼	7	▼

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S110	--		**0-23**	**0.8**	--	**25,855**	--	**1.0**	--
DGS-49	30	04/20/2011	0-24	4	▲	8,400	▼	2	▲
WLR0797WRBC22	16	07/25/1997	0-23	35	▲	1,400,000	▲	4	▲
PDI-SG-S111	--		**0-19**	**20**	--	**10,226**	--	**8**	--
LW2-G250	17	10/29/2004	0-23	16	▬	3,700	▼	9	▬
PDI-SG-S113	--		**0-28**	**11**	--	**26,350**	--	**14**	--
DGS-18SC	71	10/08/2010	0-30.5	33	▲	450,000	▲	16	▬
DGS-19SC	42	10/06/2010	0-30.5	64	▲	570,000	▲	16	▬
DGS-21	85	04/19/2011	0-27.5	19	▲	92,000	▲	19	▲
PDI-SG-S114	--		**0-13**	**55**	--	**33,970**	--	**6**	--
LW2-G254	38	09/08/2004	0-29	59	▬	10,000	▼	14	▲
PDI-SG-S115	--		**0-19**	**20**	--	**3,097**	--	**42**	--
LW2-G257	55	08/23/2004	0-26	8	▼	3,200	▬	5	▼
PDI-SG-S116	--		**0-25**	**6**	--	**4,989**	--	**4**	--
DGS-25	86	04/19/2011	0-25	19	▲	1,800	▼	12	▲
DGS-26	68	04/19/2011	0-26.5	18	▲	47,000	▲	18	▲
DGS-26SC	40	10/11/2010	0-30.5	56	▲	2,200,000	▲	29	▲
LW2-C299	93	09/22/2004	0-30	77	▲	--	--	60	▲
LW2-G297	72	08/19/2004	0-27	53	▲	130,000	▲	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S118	--		**0-30**	**12**	--	**10,220**	--	**22**	--
DGS-31	83	04/19/2011	0-27	130	▲	62,000	▲	19	▬
DGS-32SC	85	10/11/2010	0-30.5	250	▲	250,000	▲	74	▲
LW2-G305	74	08/19/2004	0-28	92	▲	22,000	▲	43	▲
LW2-G308	71	09/13/2004	0-27	59	▲	41,000	▲	26	▲
SL-03-F-PG	98	11/29/2005	0-30	--	--	7,200	▼	--	--
WLCDRD05PG054	21	05/27/2005	0-28	30	▲	21,000	▲	110	▲
WR-WSI98SD069	75	09/20/1997	0-10	--	--	120,000	▲	--	--
PDI-SG-S122	--		**0-30**	**17**	--	**924**	--	**7**	--
LW2-G267	35	08/27/2004	0-28	4	▼	410	▼	7	▬
PDI-SG-S123	--		**0-23**	**108**	--	**--**	--	**8**	--
LW2-C300-2	89	10/27/2004	0-30	310	▲	--	--	19	▲
PDI-SG-S124	--		**0-30**	**9**	--	**895**	--	**5**	--
LW2-B015	44	07/26/2004	0-15	2	▼	1,800	▲	2	▼
PDI-SG-S126	--		**0-27**	**185**	--	**154,615**	--	**17**	--
LW2-C293-2	44	10/19/2004	0-30	--	--	45,000	▼	--	--
LW2-G293	40	08/20/2004	0-28	19	▼	1,200	▼	7	▼
LW3-G671	95	11/15/2007	0-28	49	▼	1,800	▼	14	▬
PDI-SG-S130	--		**0-30**	**541**	--	**8,727**	--	**5**	--
LW2-G280	79	10/11/2004	0-25	42	▼	1,100	▼	6	▬
LWG0106R002SDS015C10	27	10/23/2002	0-15	52	▼	3,800	▼	9	▲
LWG0106R002SDS015C20	28	10/23/2002	0-15	81	▼	3,500	▼	4	▼
WR-WSI98SD073	41	09/20/1997	0-10	--	--	420	▼	--	--
PDI-SG-S133	--		**0-30**	**475**	--	**3,005**	--	**141**	--
LW2-C533	59	10/19/2005	0-30	130	▼	3,000	▬	12	▼
LW2-G282	67	10/22/2004	0-23	1,600	▲	4,100	▲	33	▼

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S134	--		**0-30**	**27**	--	**1,065**	--	**106**	--
LW2-G295	92	10/11/2004	0-25	88	▲	310	▼	4	▼
PDI-SG-S135	--		**0-17**	**11**	--	**7,543**	--	**119**	--
LW2-G329	87	08/25/2004	0-25	5	▼	700	▼	15	▼
LW2-G331	46	09/14/2004	0-26	29	▲	20,000	▲	147	▲
WLCOFJ0222C01	52	10/16/2002	0-9	--	--	79,000	▲	610	▲
WLCOFJ0222C02	29	10/16/2002	0-13	--	--	3,600	▼	101	▬
WR-WSI98SD077	23	09/21/1997	0-10	760	▲	16,000	▲	180	▲
PDI-SG-S136	--		**0-22**	**--**	--	**709**	--	**904**	--
WLCOFJ0222B02	22	10/16/2002	0-8	--	--	1,500	▲	270	▼
PDI-SG-S137	--		**0-30**	**8**	--	**794**	--	**12**	--
WLCDRD05PG064	59	05/25/2005	0-30	37	▲	2,900	▲	380	▲
WR-WSI98SD080	100	09/22/1997	0-10	--	--	2,500	▲	630	▲
PDI-SG-S138	--		**0-26**	**13**	--	**1,365**	--	**961**	--
LW2-G336	98	09/14/2004	0-26	32	▲	620	▼	340	▼
PDI-SG-S139	--		**0-26**	**27**	--	**1,679**	--	**380**	--
WR-WSI98SD084	98	09/22/1997	0-10	2,000	▲	850	▼	730	▲
PDI-SG-S141	--		**0-29**	**--**	--	**2,174**	--	**11**	--
LW2-G344	42	08/26/2004	0-28	--	--	390	▼	22	▲
PDI-SG-S142	--		**0-23**	**113**	--	**985**	--	**947**	--
LW2-G348	56	09/14/2004	0-28	116	▬	1,500	▲	1,100	▬
PDI-SG-S144	--		**0-30**	**--**	--	**695**	--	**--**	--
WLCMBJ99D09934	84	10/15/1999	0-15	--	--	1,400	▲	--	--
PDI-SG-S145	--		**0-27**	**--**	--	**56,960**	--	**--**	--
WLCMBJ99D09935	50	10/15/1999	0-15	--	--	490	▼	--	--

Exhibit A
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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S146	--		**0-29**	**37**	--	**5,441**	--	**265**	--
LW2-GBT018	92	12/16/2005	0-10	34	▬	3,100	▼	958	▲
WLRELF99OSS001	30	01/19/1999	0-10	--	--	2,600	▼	1,400	▲
WR-WSI98SD090	77	09/22/1997	0-10	4,000	▲	4,100	▼	2,400	▲
PDI-SG-S147	--		**0-25**	--	--	**2,770**	--	--	--
WLCMBJ99D09939	65	10/15/1999	0-15	--	--	250	▼	--	--
PDI-SG-S148	--		**0-29**	--	--	**557**	--	**46**	--
AP-02-D-PG	75	11/30/2005	0-30	--	--	1,600	▲	2,100	▲
WLRELF99OSS003	56	01/20/1999	0-10	--	--	630	▬	71	▲
PDI-SG-S149	--		**0-14**	**3**	--	**42**	--	**0.9**	--
LW2-B017	45	07/29/2004	0-15	2	▼	110	▲	1	▬
PDI-SG-S150	--		**0-30**	--	--	**732**	--	**57**	--
AP-04-C-PG	68	11/30/2005	0-29	--	--	2,200	▲	2,600	▲
AP-04-C-PG-2	71	11/30/2005	0-29	--	--	2,900	▲	1,500	▲
LWP1-AP04D	27	11/19/2004	0-30	--	--	--	--	860	▲
WLRELF99OSS004	96	01/19/1999	0-10	--	--	72,000	▲	30,000	▲
PDI-SG-S151	--		**0-27**	**12**	--	**700**	--	**228**	--
LW2-C356	52	11/09/2004	0-30	45	▲	--	--	--	--
LW2-G356	58	08/26/2004	0-29	--	--	830	▬	270	▬
R2-AP-02-PG	93	11/30/2005	0-30	--	--	2,100	▲	1,600	▲
WLCDRD05PG072	80	05/25/2005	0-28	96	▲	1,000	▲	950	▲
PDI-SG-S152	--		**0-30**	**49**	--	**1,069**	--	**4**	--
WR-WSI98SD096	35	09/21/1997	0-10	280	▲	3,700	▲	5	▬

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S153	--		**0-28**	**11**	--	**623**	--	**265**	--
CP-07-A-PG	50	11/30/2005	0-30	--	--	850	▲	3,100	▲
CP-07-D-PG	10	11/30/2005	0-30	--	--	160	▼	88	▼
LW2-G362-2	97	10/22/2004	0-27	27	▲	180	▼	93	▼
LW2-G366	98	10/22/2004	0-30	32	▲	420	▼	5,410	▲
WLCASF97S014	79	06/11/1997	0-10	--	--	480	▼	--	--
WR-WSI98SD097	87	09/22/1997	0-10	--	--	810	▲	3,700	▲
PDI-SG-S155	--		**0-14**	**1.5**	--	**91**	--	**2**	--
LWG0107R030SDS015C00	24	11/05/2002	0-15	27	▲	520	▲	27	▲
PDI-SG-S157	--		**0-30**	--	--	**393**	--	--	--
WLCASF97S010	85	06/11/1997	0-10	--	--	1,400	▲	--	--
WR-WSI98SD110	97	09/23/1997	0-10	--	--	1,000	▲	--	--
PDI-SG-S158	--		**0-25**	--	--	**1,339**	--	--	--
WLCASF97S010	86	06/11/1997	0-10	--	--	1,400	▬	--	--
WR-WSI98SD110	89	09/23/1997	0-10	--	--	1,000	▼	--	--
PDI-SG-S159	--		**0-30**	**19**	--	**3,402**	--	**25**	--
WLCCWI08DMMU1C	100	09/04/2008	0-5	18	▬	--	--	--	--
WLCWTG02ANCTPD02	80	07/16/2002	0-15	100	▲	895	▼	11	▼
PDI-SG-S160	--		**0-30**	**19**	--	**1,286**	--	**8**	--
LW2-G394	67	08/27/2004	0-25	790	▲	5,100	▲	459	▲
LW3-GSP07W	70	10/15/2007	0-19	2	▼	60	▼	1	▼
WLCASF97S006	86	06/12/1997	0-10	--	--	1,000	▼	--	--
WLCCWI08DMMU2A	45	09/05/2008	0-2	4	▼	--	--	--	--
WLCCWI08DMMU3B	70	09/08/2008	0-2	560	▲	--	--	--	--
WLCWTG02ANCTPD08	52	07/16/2002	0-15	125	▲	1,100	▬	10	▲
WLRWTF98HEVSD2	72	12/17/1998	0-12	--	--	500	▼	3	▼

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S161	--		**0-29**	**10**	--	**772**	--	**6**	--
WLCASF97S008	81	06/12/1997	0-10	--	--	800	▬	--	--
WLCCWI08ANCTPD06	28	05/29/2009	0-2	4	▼	--	--	--	--
WLCWTG02ANCTPD06	27	07/16/2002	0-15	120	▲	1,250	▲	14	▲
WR-WSI98SD113	82	09/23/1997	0-10	--	--	940	▲	--	--
PDI-SG-S162	--		**0-30**	**--**	**--**	**1,154**	**--**	**--**	**--**
WR-WSI98SD115	57	09/23/1997	0-10	--	--	430	▼	--	--
PDI-SG-S163	--		**0-30**	**15**	--	**1,039**	--	**8**	--
LW2-C532	67	10/18/2005	0-30	150	▲	800	▼	14	▲
LW3-G694	87	11/16/2007	0-20	89	▲	1,300	▲	15	▲
WLCASF97S004	99	06/12/1997	0-10	--	--	1,700	▲	--	--
PDI-SG-S165	--		**0-27**	**14**	--	**410**	--	**4**	--
LWG0108R002SDS015C00	80	10/17/2002	0-15	36	▲	420	▬	1	▼
PDI-SG-S172	--		**0-30**	**56**	--	**1,584**	--	**--**	**--**
PSYSEA98PSY18	73	04/04/1998	0-10	280	▲	4,600	▲	--	--
PDI-SG-S175	--		**0-30**	**9**	--	**470**	--	**--**	**--**
PSYSEA98PSY33	56	04/02/1998	0-10	10	▬	500	▬	--	--
PDI-SG-S176	--		**0-26**	**2,236**	--	**5,881**	--	**46**	--
LW2-G376	19	10/29/2004	0-29	220	▼	940	▼	13	▼
PSYSEA98PSY23	89	04/05/1998	0-10	68	▼	1,200	▼	--	--
WR-WSI98SD128	62	09/23/1997	0-10	1,100	▼	9,952	▲	--	--
PDI-SG-S178	--		**0-30**	**327**	--	**1,363**	--	**--**	**--**
PSYSEA98PSY20	11	04/04/1998	0-10	280	▬	1,900	▲	--	--
PDI-SG-S179	--		**0-30**	**248**	--	**4,393**	--	**18**	--
LW2-GBT023	79	12/20/2005	0-10	82	▼	940	▼	7	▼
PSYSEA98PSY29	81	04/03/1998	0-10	320	▲	4,500	▬	--	--

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S182	--		**0-30**	**239**	--	**10,522**	--	**21**	--
LW2-G392	38	10/08/2004	0-30	41	▼	4,700	▼	6	▼
PDI-SG-S183	--		**0-27**	**867**	--	**9,022**	--	**16**	--
LW2-G384	82	08/23/2004	0-27	57	▼	400	▼	5	▼
LW2-G384-2	79	08/23/2004	0-29	100	▼	680	▼	5	▼
PDI-SG-S186	--		**0-30**	**213**	--	**6,603**	--	**7**	--
LWG0108R040SDS015C00	79	10/28/2002	0-15	430	▲	8,000	▲	23	▲
PDI-SG-S191	--		**0-26**	**3,910**	--	**26,134**	--	**59**	--
LW2-G390	54	08/23/2004	0-28	730	▼	16,000	▼	62	▬
WR-WSI98SD133	9	09/23/1997	0-10	1,200	▼	4,700	▼	--	--
PDI-SG-S196	--		**0-24**	**535**	--	**1,266**	--	**9**	--
LW2-B022	12	07/27/2004	0-15	111	▼	6,850	▲	6	▼
LW2-C434	75	11/11/2004	0-30	--	--	770	▼	--	--
LW2-G432	57	08/27/2004	0-26	629	▬	3,100	▲	17	▲
LW2-G434	93	08/27/2004	0-26	100	▼	8,600	▲	10	▬
WLCOFJ021901	100	10/18/2002	0-15	--	--	2,500	▲	20	▲
WLCOFJ021903	57	10/18/2002	0-15	--	--	1,700	▲	25	▲
WLCOFJ0219A01	70	10/18/2002	0-8	--	--	10,000	▲	58	▲
WLCOFJ0219A02	76	10/18/2002	0-12	--	--	3,500	▲	16	▲
WLCOFJ0219A03	10	10/18/2002	0-10	--	--	2,100	▲	17	▲
PDI-SG-S197/PDI-SG-S197-D	--		**0-29**	**--**	--	**2,269**	--	**--**	--
R2-GN-01-PG	100	11/28/2005	0-27	--	--	310	▼	--	--
PDI-SG-S198	--		**0-30**	**367**	--	**2,547**	--	**7**	--
LW2-G379	42	09/09/2004	0-28	420	▬	1,500	▼	10	▲
PDI-SG-S199	--		**0-18**	**22**	--	**2,497**	--	**3**	--
PSYSEA98PSY12	43	04/04/1998	0-10	82	▲	20,000	▲	2	▼

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S202	**--**		**0-30**	**--**	**--**	**516**	**--**	**--**	**--**
GN-02-E-PG	60	12/02/2005	0-26	--	--	460	▬	--	--
PDI-SG-S204	**--**		**0-17**	**93**	**--**	**989**	**--**	**2**	**--**
LW2-G383	61	10/08/2004	0-20	40	▼	530	▼	5	▲
PSYSEA98PSY08	72	04/07/1998	0-10	187	▲	7,567	▲	10	▲
WLCOFH02M101	25	08/22/2002	0-15	280	▲	2,110	▲	15	▲
WLCOFH02M103	73	08/22/2002	0-15	138	▲	3,240	▲	15	▲
WLCOFH02M104	54	08/22/2002	0-15	7	▼	230	▼	5	▲
WLCOFH02M106	38	08/22/2002	0-15	47	▼	3,500	▲	5	▲
WLCOFH02M109	87	08/22/2002	0-15	200	▲	1,400	▲	11	▲
WLCOFH02M110	64	08/22/2002	0-15	24	▼	530	▼	5	▲
WR-WSI98SD136	74	09/22/1997	0-10	--	--	1,200	▲	--	--
PDI-SG-S206	**--**		**0-30**	**--**	**--**	**1,364**	**--**	**--**	**--**
GN-05-A-PG	40	12/02/2005	0-27	--	--	860	▼	--	--
GN-05-A-PG-2	34	12/02/2005	0-27	--	--	1,500	▬	--	--
PDI-SG-S207	**--**		**0-30**	**9**	**--**	**328**	**--**	**4**	**--**
LW3-G717	72	12/04/2007	0-29	21	▲	200	▼	4	▬
PDI-SG-S210	**--**		**0-28**	**26**	**--**	**815**	**--**	**5**	**--**
LW2-G444	28	08/25/2004	0-27	90	▲	430	▼	218	▲
PDI-SG-S211	**--**		**0-30**	**130**	**--**	**1,882**	**--**	**--**	**--**
LW2-G402	94	09/09/2004	0-30	660	▲	2,500	▲	--	--
PDI-SG-S214	**--**		**0-15**	**0.7**	**--**	**14**	**--**	**0.9**	**--**
LW2-G396	17	10/11/2004	0-23	3	▲	42	▲	--	--

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PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S215	--		**0-30**	**136**	--	**1,972**	--	**10**	--
LW2-G408	6	10/29/2004	0-24	134	▬	1,300	▼	13	▲
PSYSEA98PSY10	41	04/05/1998	0-10	150	▬	4,300	▲	--	--
WR-WSI98SD139	54	09/22/1997	0-10	--	--	2,000	▬	--	--
PDI-SG-S217	--		**0-30**	**14**	--	**650**	--	**5**	--
LW2-C448	43	10/26/2004	0-30	--	--	--	--	11	▲
LW2-G448	47	08/31/2004	0-30	91	▲	260	▼	--	--
WR-WSI98SD142	84	09/24/1997	0-10	--	--	970	▲	--	--
PDI-SG-S221	--		**0-30**	**21**	--	**675**	--	**6**	--
LW2-G450	21	08/25/2004	0-27	140	▲	550	▬	19	▲
LW2-G450-2	16	08/25/2004	0-28	130	▲	460	▼	14	▲
PDI-SG-S222	--		**0-30**	**368**	--	**2,611**	--	**145**	--
LW2-G453	93	08/31/2004	0-26	35,000	▲	5,700	▲	3,930	▲
LW2-G455	90	08/25/2004	0-24	990	▲	860	▼	41	▼
LW2-GBT028	65	12/08/2005	0-10	1,500	▲	1,000	▼	88	▼
WR-WSI98SD143	14	09/24/1997	0-10	--	--	770	▼	--	--
PDI-SG-S224	--		**0-24**	**24**	--	**5,631**	--	**--**	--
PSYSEA98PSY06	38	04/05/1998	0-10	10	▼	290	▼	--	--
PDI-SG-S226	--		**0-26**	**15**	--	**440**	--	**5**	--
LW2-G456	48	08/31/2004	0-24	230	▲	5,900	▲	28	▲
WR-WSI98SD146	86	09/24/1997	0-10	--	--	350	▼	--	--
PDI-SG-S227	--		**0-27**	**14**	--	**455**	--	**5**	--
LW2-G458	93	08/24/2004	0-27	34	▲	410	▬	3	▼
WR-WSI98SD147	85	09/24/1997	0-10	--	--	360	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S229	**--**		**0-28**	**76**	**--**	**3,184**	**--**	**6**	**--**
LW2-C421	68	10/07/2004	0-30	--	--	--	--	31	▲
LW2-G421	69	09/09/2004	0-30	600	▲	6,400	▲	--	--
PDI-SG-S230	**--**		**0-27**	**83**	**--**	**1,786**	**--**	**--**	**--**
PSYSEA98PSY05	95	04/05/1998	0-10	78	▬	1,900	▬	--	--
PDI-SG-S231	**--**		**0-28**	**87**	**--**	**2,226**	**--**	**9**	**--**
LW2-NA4B	98	10/21/2004	0-24	170	▲	690	▼	10	▬
PDI-SG-S233	**--**		**0-24**	**85**	**--**	**2,260**	**--**	**7**	**--**
LW2-G417	76	10/22/2004	0-26	90	▬	200	▼	5	▼
PDI-SG-S234	**--**		**0-29**	**--**	**--**	**1,853**	**--**	**--**	**--**
LW2-C426	83	09/22/2004	0-30	--	--	510	▼	--	--
PDI-SG-S235	**--**		**0-29**	**93**	**--**	**1,862**	**--**	**--**	**--**
PSYSEA98PSY04	32	04/05/1998	0-10	140	▲	2,100	▬	--	--
PDI-SG-S236	**--**		**0-30**	**38**	**--**	**1,296**	**--**	**3**	**--**
LW2-GBT029	95	12/09/2005	0-10	53	▲	320	▼	4	▲
PDI-SG-S240/PDI-SG-S240-D	**--**		**0-16**	**0**	**--**	**153**	**--**	**0.9**	**--**
LW2-B020	7	07/30/2004	0-15	40	▲	180	▬	2	▲
PDI-SG-S241	**--**		**0-28**	**--**	**--**	**2,160**	**--**	**--**	**--**
WR-WSI98SD148	93	09/22/1997	0-10	--	--	1,700	▼	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S242	--		**0-21**	**4**	--	**421**	--	**0.9**	--
LW2-C430	66	11/10/2004	0-30	180	▲	1,400	▲	--	--
LW2-G430	38	10/22/2004	0-25	8	▲	1,200	▲	--	--
PSYSEA98PSY03	52	04/05/1998	0-10	10	▲	4,700	▲	--	--
WLCOFJ02S0202	72	10/14/2002	0-15	--	--	120	▼	2	▲
WLCOFJ02S0203	28	10/14/2002	0-15	--	--	190	▼	2	▲
WLCOFJ02S0204	87	10/14/2002	0-15	--	--	980	▲	3	▲
WLCOFJ02S0205	86	10/14/2002	0-15	--	--	170	▼	2	▲
PDI-SG-S244	--		**0-27**	**21**	--	**574**	--	**6**	--
LW2-G477	58	09/01/2004	0-28	1,900	▲	4,700	▲	64	▲
LW3-GSP09W	39	10/17/2007	0-11	700	▲	660	▬	23	▲
PDI-SG-S248	--		**0-30**	**12**	--	**997**	--	**5**	--
LW3-G735	79	11/30/2007	0-28	55	▲	1,400	▲	6	▲
PDI-SG-S250	--		**0-29**	**9**	--	**306**	--	**5**	--
LW2-G485	66	08/31/2004	0-27	120	▲	340	▬	4	▬
PDI-SG-S253	--		**0-30**	**58**	--	**1,742**	--	**3**	--
LW3-G738	95	12/04/2007	0-24	600	▲	16,000	▲	21	▲
PDI-SG-S255	--		**0-14**	**13**	--	**1,119**	--	**0.9**	--
LW2-B026	77	07/26/2004	0-15	380	▲	2,700	▲	19	▲
PDI-SG-S256	--		**0-30**	**12**	--	**780**	--	**2**	--
LW2-B026	100	07/26/2004	0-15	380	▲	2,700	▲	19	▲
PDI-SG-S258	--		**0-30**	**9**	--	**733**	--	**3**	--
LW2-GBT033	47	12/19/2005	0-10	28	▲	340	▼	3	▬
WLCAYH00SD04	92	08/09/2000	0-20	580	▲	960	▲	--	--
WLCGAL00GAUPOF	74	12/21/2000	0-30	--	--	1,700	▲	--	--

Exhibit A
Replacement of Historical Records Based on Newer Records within the Same Proximity

PDI Sample Name Historical Sample Name	Distance from PDI Location (feet)	Sample Date	Sample Depth (cm)	Total PCBs (ug/kg)		Total PAHs (ug/kg)		Total DDx (ug/kg)	
PDI-SG-S259	**--**		**0-30**	**6**	**--**	**443**	**--**	**5**	**--**
LW2-G491	74	09/02/2004	0-28	43	▲	1,400	▲	6	▲
PDI-SG-S261	**--**		**0-30**	**--**	**--**	**692**	**--**	**--**	**--**
WLCSPL03SED02	65	12/22/2003	0-15	--	--	523	▼	--	--
WLCSPL03SED03	50	12/22/2003	0-15	--	--	1,800	▲	--	--
WLCSPL03SED04	58	12/22/2003	0-15	--	--	2,900	▲	--	--
PDI-SG-S262	**--**		**0-30**	**12**	**--**	**239**	**--**	**4**	**--**
LW2-G509	34	09/03/2004	0-26	15	▲	310	▲	4	▬

General Notes:
1. Historical locations in blue are within 100-feet of two or more PDI locations.

Abbreviations:
-- = No Data
cm = centimeters
DDx = dichlorodiphenyltrichloroethane and its derivatives
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PDI = Pre-Remedial Design Investigation
ug/kg = micrograms per kilogram

Legend:
▲ Concentration at historical location is more than 20% above the PDI concentration
▬ Concentration at historical location is between +/- 20% of the PDI concentration
▼ Concentration at historical location is more than 20% below the PDI concentration
sample Historical location is within 100-feet of two or more PDI locations.

EXHIBIT B

Risk Calculation Spreadsheets

Table B-1. Values Used for Daily Intake Calculations - Nearshore Surface Sediment (Tribal Fisher, PDI Scenario)

Parameter Code	Parameter Definition	Unit	Tribal Fisher RME		Equations
General Exposure Parameters					
CS	Concentration in Surface Sediment	mg/kg	--	(a)	
BW	Body Weight	kg	80	(b)	CDI-C (mg/kg-day) = IFing-C x CS x ABS
EF	Exposure Frequency	days/year	260	(c)	CDI-NC (mg/kg-day) = IFing-NC x CS x ABS
ED	Exposure Duration	years	70	(d)	
AT-C	Averaging Time (Cancer)	days	25,550	(b)	70 years x 365 days per year
AT-N	Averaging Time (Noncancer)	days	25,550	(b)	ED (years) x 365 days/year
FC	Sediment Contact Frequency	Fraction	25%	(f)	
CF	Conversion Factor	kg/mg	1E-06		
Sediment Ingestion Exposure Factors					
SIR	Ingestion Rate of Sediment	mg/day	50	(g)	
ABS	Absorption Factor	dimensionless	--	(a)	
IFing-C	Intake factor, cancer	(kg-sed)/(kg-bw/d)	1.11E-07		$\frac{SIR \times FC \times EF \times ED \times CF}{BW \times ATc}$
IFing-NC	Intake factor, noncancer	(kg-sed)/(kg-bw/d)	1.11E-07		$\frac{SIR \times FC \times EF \times ED \times CF}{BW \times ATnc}$
Sediment Dermal Exposure Factors					
SA	Skin Surface Area	cm^2/day	1,980	(h)	
AF	Adherence Factor	mg/cm^2	0.3	(i)	CDI-C (mg/kg-day) = IFderm-C x CS x DAF
DAF	Dermal Absorption Factor	dimensionless	--	(a)	CDI-NC (mg/kg-day) = IFderm-NC x CS x DAF
EV	Event Frequency	events/day	1		
IFderm-C	Intake factor, cancer	(kg-sed)/(kg-bw/d)	1.32E-06		$\frac{FC \times SA \times AF \times EV \times EF \times ED \times CF}{(BW \times ATc)}$
IFderm-NC	Intake factor, noncancer	(kg-sed)/(kg-bw/d)	1.32E-06		$\frac{FC \times SA \times AF \times EV \times EF \times ED \times CF}{BW \times Atnc}$

Notes:

a. Chemical-specific. Presented in Table B-2a.
b. EPA. 2014 Standard Default Exposure factors.
c. Required by Region 10. 5 days per week for entire year.
d. Conventional lifetime (EPA 1989).
f. Represents the percent of time spent fishing in a single area within the study area. Recommended by EPA Region 10.
g. Recommended by EPA Region 10. Assumed to be 50% of soil ingestion.
h. Average surface area for hands and forearms of men (EPA 1997).
i. Value for residential adults as gardeners (EPA 2004).

Acronyms:

bw/d = body weight per day
CDI = chronic daily intake
cm = centimeter
EPA = United States Environmental Protection Agency
g = gram
kg = kilogram
mg = milligram
RI/FS = remedial investigation/feasiblity study
RME = reasonable maximum exposure

Sources:

EPA. 1997. Exposure Factors Handbook. Office of Research and Development, Volumes I-III,
EPA. 2004. Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment Final. EPA/540/R/99/005.
EPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Assessment and Remediation Division, Office of Superfund Remediation and Technology Innovation.

Table B-2a. Calculation of Unit SWAC Cancer Risks and Non-Cancer Hazards
Tribal Fisher - In-water Sediment Exposure
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit SWAC (a) (mg/kg)	Dermal Absorption Factor (b)	Cancer Risk Calculations (Adult/Child)							Noncancer Hazard Calculations						
			Intake (mg/kg-day) (c)		CSF (mg/kg-day)$^{-1}$ (d)		Unit Cancer Risk			Intake (mg/kg-day) (c)		RfD (mg/kg-day) (d)		Unit Hazard Quotient		
			Ingestion	Dermal	Oral	Dermal	Ingestion	Dermal	Total	Ingestion	Dermal	Oral	Dermal	Ingestion	Dermal	Total
total PCB	1	0.14	1.11E-07	1.85E-07	2.00E+00	2.00E+00	2.23E-07	3.70E-07	5.93E-07	1.11E-07	1.85E-07	2.00E-05	2.00E-05	5.57E-03	9.26E-03	1.48E-02
Benzo(a)pyrene-TEQ	1	0.13	1.11E-07	1.72E-07	1.00E+00	1.00E+00	1.11E-07	1.72E-07	2.83E-07	1.11E-07	1.72E-07	3.00E-04	3.00E-04	3.71E-04	5.73E-04	9.44E-04
DDx	1	0.03	1.11E-07	3.97E-08	3.40E-01	3.40E-01	3.78E-08	1.35E-08	5.13E-08	1.11E-07	3.97E-08	5.00E-04	5.00E-04	2.23E-04	7.93E-05	3.02E-04
2,3,7,8-TCDD	1	0.03	1.11E-07	3.97E-08	1.30E+05	1.30E+05	1.45E-02	5.16E-03	1.96E-02	1.11E-07	3.97E-08	7.00E-10	7.00E-10	1.59E+02	5.67E+01	2.16E+02
1,2,3,7,8-PeCDD	1	0.03	1.11E-07	3.97E-08	1.30E+05	1.30E+05	1.45E-02	5.16E-03	1.96E-02	1.11E-07	3.97E-08	7.00E-10	7.00E-10	1.59E+02	5.67E+01	2.16E+02
2,3,4,7,8-PeCDF	1	0.03	1.11E-07	3.97E-08	3.90E+04	1.30E+05	4.34E-03	5.16E-03	9.50E-03	1.11E-07	3.97E-08	2.10E-10	7.00E-10	5.30E+02	5.67E+01	5.87E+02

Notes:

a. A unit SWAC of 1 mg/kg is used to calculate a lifetime cancer risk and noncancer hazard quotient. Potential cancer risk and hazard quotient calculated based on unit SWAC are adjusted based on SWACs in Table B-1b. Total potential cancer risks and noncancer hazards are presented in Table B-2b.

a. EPA 2004. Exhibit 3-1.

c. Intake assumptions and equations presented in Table B-1 and are equivalent to those used in the 2013 human health risk assessment with the exception of body weight, which was updated to 80 kilograms consistent with current EPA default.

d. EPA 2019 (PCBs, DDx, Benzo(a)pyrene-TEQ, TCDD RfD); CalEPA 2019 (TCDD CSF). PeCDD values derived by multiplying TCDD value by TEF of 1 (USEPA 2010). PeCDF values derived by multiplying TCDD value by TEF of 0.3 (USEPA 2010).

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
EPA = United States Environmental Protection Agency
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEF = toxicity equivalency factor
TEQ = toxicity equivalence

Sources:

CalEPA. 2019. Toxicity Criteria Database. http://www.oehha.ca.gov/risk/ChemicalDB/index.asp.
EPA. 2004. Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment Final. EPA/540/R/99/005.
EPA. 2010. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds. EPA/100/R 10/005.
EPA. 2019. Integrated Risk Information System (IRIS) database [online]. Environmental Criteria and Assessment Office, US Environmental Protection Agency, Washington, DC. Available from: http//www.epa.gov/ngispgm3/iris.

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment Site-wide Pre-Construction			Nearshore Sediment Site-wide Post-Construction 3 Focused COCs			Nearshore Sediment River Mile 1.9 to 3 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	7.84E-02	4.65E-08	1.16E-03	3.92E-02	2.32E-08	5.81E-04	4.03E-02	2.39E-08	5.97E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	4.90E-01	1.39E-07	4.62E-04	2.34E-01	6.62E-08	2.21E-04	1.56E-01	4.41E-08	1.47E-04
DDx	5.13E-08	3.02E-04	Liver	7.17E-02	3.68E-09	2.16E-05	1.24E-02	6.36E-10	3.74E-06	5.06E-03	2.60E-10	1.53E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	4.06E-07	7.97E-09	8.76E-05	3.58E-07	7.03E-09	7.72E-05	1.86E-07	3.64E-09	4.00E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.03E-05	9.78E-08	6.04E-03	2.46E-06	2.34E-08	1.44E-03	3.35E-07	3.18E-09	1.97E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.54E-06	4.99E-08	5.48E-04	2.42E-06	4.75E-08	5.22E-04	4.89E-07	9.60E-09	1.05E-04
			Total		3.45E-07	8.32E-03		1.68E-07	2.85E-03		8.47E-08	1.09E-03

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	7.14E-03	Developmental	2.26E-03	Developmental	4.89E-04
Eye, nails, immune	1.16E-03	Eye, nails, immune	5.81E-04	Eye, nails, immune	5.97E-04
Liver	2.16E-05	Liver	3.74E-06	Liver	1.53E-06
Reproductive	6.68E-03	Reproductive	2.04E-03	Reproductive	3.42E-04

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 1.9 to 3 West			Nearshore Sediment River Mile 3 to 4 East			Nearshore Sediment River Mile 3 to 4 West		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	6.04E-03	3.58E-09	8.95E-05	3.72E-02	2.21E-08	5.52E-04	1.42E-02	8.39E-09	2.10E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	1.52E-01	4.29E-08	1.43E-04	1.89E-01	5.35E-08	1.78E-04	3.85E-01	1.09E-07	3.63E-04
DDx	5.13E-08	3.02E-04	Liver	4.04E-03	2.07E-10	1.22E-06	4.59E-03	2.36E-10	1.39E-06	6.94E-03	3.56E-10	2.10E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.15E-07	2.27E-09	2.49E-05	1.60E-07	3.14E-09	3.45E-05	2.22E-07	4.36E-09	4.79E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.89E-07	1.79E-09	1.11E-04	3.31E-07	3.14E-09	1.94E-04	2.43E-07	2.31E-09	1.42E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.66E-07	5.22E-09	5.74E-05	5.17E-07	1.01E-08	1.11E-04	1.21E-06	2.37E-08	2.61E-04
			Total		5.60E-08	4.27E-04		9.22E-08	1.07E-03		1.48E-07	1.03E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	3.36E-04	Developmental	5.18E-04	Developmental	8.14E-04
Eye, nails, immune	8.95E-05	Eye, nails, immune	5.52E-04	Eye, nails, immune	2.10E-04
Liver	1.22E-06	Liver	1.39E-06	Liver	2.10E-06
Reproductive	1.93E-04	Reproductive	3.40E-04	Reproductive	4.51E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 4 to 5 East			Nearshore Sediment River Mile 4 to 5 West			Nearshore Sediment River Mile 5 to 6 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	2.38E-02	1.41E-08	3.52E-04	1.56E-02	9.27E-09	2.32E-04	5.21E-02	3.09E-08	7.72E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	4.18E-01	1.18E-07	3.94E-04	7.58E-01	2.15E-07	7.15E-04	4.27E-01	1.21E-07	4.03E-04
DDx	5.13E-08	3.02E-04	Liver	5.32E-03	2.73E-10	1.61E-06	1.84E-02	9.45E-10	5.56E-06	7.72E-03	3.96E-10	2.33E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	4.18E-07	8.20E-09	9.01E-05	3.62E-07	7.10E-09	7.80E-05	4.89E-07	9.60E-09	1.05E-04
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	5.69E-07	5.40E-09	3.34E-04	4.09E-07	3.89E-09	2.40E-04	7.33E-07	6.96E-09	4.30E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	3.60E-06	7.07E-08	7.77E-04	1.15E-06	2.25E-08	2.47E-04	7.90E-07	1.55E-08	1.70E-04
			Total		2.17E-07	1.95E-03		2.58E-07	1.52E-03		1.84E-07	1.88E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	1.59E-03	Developmental	1.28E-03	Developmental	1.11E-03
Eye, nails, immune	3.52E-04	Eye, nails, immune	2.32E-04	Eye, nails, immune	7.72E-04
Liver	1.61E-06	Liver	5.56E-06	Liver	2.33E-06
Reproductive	1.20E-03	Reproductive	5.65E-04	Reproductive	7.06E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 5 to 6 West			Nearshore Sediment River Mile 6 to 7 East			Nearshore Sediment River Mile 6 to 7 West		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	9.47E-03	5.61E-09	1.40E-04	4.83E-02	2.86E-08	7.16E-04	1.62E-02	9.61E-09	2.40E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	4.19E-01	1.19E-07	3.96E-04	3.86E-01	1.09E-07	3.65E-04	4.72E-01	1.34E-07	4.46E-04
DDx	5.13E-08	3.02E-04	Liver	1.16E-02	5.98E-10	3.51E-06	1.21E-02	6.19E-10	3.64E-06	4.21E-02	2.16E-09	1.27E-05
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.32E-07	4.55E-09	5.00E-05	7.64E-07	1.50E-08	1.65E-04	2.51E-07	4.92E-09	5.41E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	4.49E-07	4.26E-09	2.63E-04	2.40E-05	2.28E-07	1.41E-02	4.20E-07	3.99E-09	2.46E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.81E-06	3.56E-08	3.91E-04	2.64E-06	5.19E-08	5.70E-04	5.55E-06	1.09E-07	1.20E-03
			Total		1.69E-07	1.24E-03		4.34E-07	1.59E-02		2.63E-07	2.20E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	1.10E-03	Developmental	1.52E-02	Developmental	1.94E-03
Eye, nails, immune	1.40E-04	Eye, nails, immune	7.16E-04	Eye, nails, immune	2.40E-04
Liver	3.51E-06	Liver	3.64E-06	Liver	1.27E-05
Reproductive	7.05E-04	Reproductive	1.48E-02	Reproductive	1.50E-03

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 7 to 8 East			Nearshore Sediment River Mile 7 to 8 West			Nearshore Sediment River Mile 8 to 9 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	2.99E-02	1.77E-08	4.44E-04	1.89E-02	1.12E-08	2.80E-04	1.92E-02	1.14E-08	2.84E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	2.38E-01	6.73E-08	2.24E-04	9.11E-02	2.58E-08	8.60E-05	4.29E-02	1.21E-08	4.05E-05
DDx	5.13E-08	3.02E-04	Liver	5.49E-03	2.82E-10	1.66E-06	7.74E-02	3.97E-09	2.34E-05	4.20E-03	2.15E-10	1.27E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	4.70E-07	9.22E-09	1.01E-04	2.67E-07	5.23E-09	5.75E-05	1.96E-07	3.84E-09	4.22E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.30E-06	1.23E-08	7.60E-04	4.73E-07	4.49E-09	2.77E-04	3.24E-07	3.08E-09	1.90E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.63E-06	3.19E-08	3.50E-04	2.35E-05	4.62E-07	5.08E-03	2.80E-07	5.50E-09	6.05E-05
			Total		1.39E-07	1.88E-03		5.13E-07	5.80E-03		3.62E-08	6.19E-04

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	1.44E-03	Developmental	5.50E-03	Developmental	3.33E-04
Eye, nails, immune	4.44E-04	Eye, nails, immune	2.80E-04	Eye, nails, immune	2.84E-04
Liver	1.66E-06	Liver	2.34E-05	Liver	1.27E-06
Reproductive	1.21E-03	Reproductive	5.41E-03	Reproductive	2.93E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 8 to 9 West			Nearshore Sediment River Mile 9 to 10 East			Nearshore Sediment River Mile 9 to 10 West		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	6.10E-02	3.62E-08	9.04E-04	2.09E-02	1.24E-08	3.10E-04	1.71E-02	1.01E-08	2.54E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	9.41E-02	2.67E-08	8.88E-05	4.64E-02	1.31E-08	4.38E-05	6.87E-02	1.95E-08	6.48E-05
DDx	5.13E-08	3.02E-04	Liver	2.73E-02	1.40E-09	8.25E-06	2.45E-03	1.26E-10	7.39E-07	4.38E-03	2.25E-10	1.32E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	6.87E-07	1.35E-08	1.48E-04	1.86E-07	3.65E-09	4.02E-05	3.68E-07	7.22E-09	7.93E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	6.78E-07	6.44E-09	3.98E-04	3.09E-07	2.93E-09	1.81E-04	4.03E-07	3.83E-09	2.37E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	7.44E-07	1.46E-08	1.60E-04	2.85E-07	5.59E-09	6.14E-05	3.35E-07	6.57E-09	7.22E-05
			Total		9.87E-08	1.71E-03		3.78E-08	6.37E-04		4.74E-08	7.08E-04

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	7.95E-04	Developmental	3.27E-04	Developmental	4.53E-04
Eye, nails, immune	9.04E-04	Eye, nails, immune	3.10E-04	Eye, nails, immune	2.54E-04
Liver	8.25E-06	Liver	7.39E-07	Liver	1.32E-06
Reproductive	7.06E-04	Reproductive	2.83E-04	Reproductive	3.88E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 10 to 11 East			Nearshore Sediment River Mile 10 to 11 West			Nearshore Sediment River Mile 11 to 11.8 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	2.35E-02	1.39E-08	3.48E-04	1.20E-02	7.11E-09	1.78E-04	1.10E-01	6.52E-08	1.63E-03
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	5.78E-02	1.64E-08	5.45E-05	9.79E-02	2.77E-08	9.24E-05	5.17E-02	1.46E-08	4.88E-05
DDx	5.13E-08	3.02E-04	Liver	3.32E-03	1.71E-10	1.00E-06	1.10E-02	5.67E-10	3.33E-06	2.99E-03	1.54E-10	9.03E-07
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.59E-07	5.08E-09	5.58E-05	3.48E-07	6.82E-09	7.50E-05	2.24E-07	4.40E-09	4.84E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	5.55E-07	5.27E-09	3.26E-04	5.12E-07	4.86E-09	3.00E-04	3.72E-07	3.53E-09	2.18E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	3.61E-07	7.09E-09	7.79E-05	4.28E-07	8.39E-09	9.22E-05	2.87E-07	5.64E-09	6.20E-05
			Total		4.79E-08	8.63E-04		5.55E-08	7.41E-04		9.36E-08	2.01E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	5.14E-04	Developmental	5.60E-04	Developmental	3.77E-04
Eye, nails, immune	3.48E-04	Eye, nails, immune	1.78E-04	Eye, nails, immune	1.63E-03
Liver	1.00E-06	Liver	3.33E-06	Liver	9.03E-07
Reproductive	4.59E-04	Reproductive	4.67E-04	Reproductive	3.28E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2b. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (SWAC based on PCBs, DDx, and Benzo(a)pyrene-TEQ)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sed.
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 11 to 11.8 West			Swan Island Lagoon		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	3.56E-03	2.11E-09	5.28E-05	1.11E-01	6.57E-08	1.64E-03
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	3.12E-02	8.83E-09	2.94E-05	1.87E-01	5.29E-08	1.76E-04
DDx	5.13E-08	3.02E-04	Liver	3.18E-03	1.63E-10	9.60E-07	7.09E-03	3.64E-10	2.14E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.72E-07	5.34E-09	5.87E-05	5.48E-07	1.08E-08	1.18E-04
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	2.99E-07	2.84E-09	1.76E-04	1.13E-06	1.07E-08	6.63E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.03E-07	3.98E-09	4.37E-05	1.35E-06	2.66E-08	2.92E-04
			Total		2.33E-08	3.61E-04		1.67E-07	2.89E-03

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI
Developmental	3.07E-04	Developmental	1.25E-03
Eye, nails, immune	5.28E-05	Eye, nails, immune	1.64E-03
Liver	9.60E-07	Liver	2.14E-06
Reproductive	2.78E-04	Reproductive	1.07E-03

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment Site-wide Pre-Construction			Nearshore Sediment Site-wide Post-Construction 6 Focused COCs			Nearshore Sediment River Mile 1.9 to 3 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	7.84E-02	4.65E-08	1.16E-03	3.67E-02	2.18E-08	5.44E-04	4.03E-02	2.39E-08	5.97E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	4.90E-01	1.39E-07	4.62E-04	2.17E-01	6.15E-08	2.05E-04	1.56E-01	4.41E-08	1.47E-04
DDx	5.13E-08	3.02E-04	Liver	7.17E-02	3.68E-09	2.16E-05	1.16E-02	5.95E-10	3.50E-06	5.06E-03	2.60E-10	1.53E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	4.06E-07	7.97E-09	8.76E-05	2.84E-07	5.57E-09	6.13E-05	1.86E-07	3.64E-09	4.00E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.03E-05	9.78E-08	6.04E-03	2.21E-06	2.10E-08	1.30E-03	3.35E-07	3.18E-09	1.97E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.54E-06	4.99E-08	5.48E-04	6.09E-07	1.20E-08	1.31E-04	4.89E-07	9.60E-09	1.05E-04
Total					3.45E-07	8.32E-03		1.22E-07	2.24E-03		8.47E-08	1.09E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	7.14E-03	Developmental	1.69E-03	Developmental	4.89E-04
Eye, nails, immune	1.16E-03	Eye, nails, immune	5.44E-04	Eye, nails, immune	5.97E-04
Liver	2.16E-05	Liver	3.50E-06	Liver	1.53E-06
Reproductive	6.68E-03	Reproductive	1.49E-03	Reproductive	3.42E-04

Notes:
a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:
1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 1.9 to 3 West			Nearshore Sediment River Mile 3 to 4 East			Nearshore Sediment River Mile 3 to 4 West			Nearshore Sediment River Mile 4 to 5 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	6.04E-03	3.58E-09	8.95E-05	3.72E-02	2.21E-08	5.52E-04	1.42E-02	8.39E-09	2.10E-04	2.31E-02	1.37E-08	3.42E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	1.52E-01	4.29E-08	1.43E-04	1.89E-01	5.35E-08	1.78E-04	3.85E-01	1.09E-07	3.63E-04	3.91E-01	1.11E-07	3.69E-04
DDx	5.13E-08	3.02E-04	Liver	4.04E-03	2.07E-10	1.22E-06	4.59E-03	2.36E-10	1.39E-06	6.94E-03	3.56E-10	2.10E-06	5.23E-03	2.68E-10	1.58E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.15E-07	2.27E-09	2.49E-05	1.60E-07	3.14E-09	3.45E-05	2.22E-07	4.36E-09	4.79E-05	3.79E-07	7.44E-09	8.17E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.89E-07	1.79E-09	1.11E-04	3.31E-07	3.14E-09	1.94E-04	2.43E-07	2.31E-09	1.42E-04	5.39E-07	5.12E-09	3.16E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.66E-07	5.22E-09	5.74E-05	5.17E-07	1.01E-08	1.11E-04	1.21E-06	2.37E-08	2.61E-04	3.33E-06	6.53E-08	7.18E-04
Total					5.60E-08	4.27E-04		9.22E-08	1.07E-03		1.48E-07	1.03E-03		2.03E-07	1.83E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	3.36E-04	Developmental	5.18E-04	Developmental	8.14E-04	Developmental	1.49E-03
Eye, nails, immune	8.95E-05	Eye, nails, immune	5.52E-04	Eye, nails, immune	2.10E-04	Eye, nails, immune	3.42E-04
Liver	1.22E-06	Liver	1.39E-06	Liver	2.10E-06	Liver	1.58E-06
Reproductive	1.93E-04	Reproductive	3.40E-04	Reproductive	4.51E-04	Reproductive	1.12E-03

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 4 to 5 West			Nearshore Sediment River Mile 5 to 6 East			Nearshore Sediment River Mile 5 to 6 West			Nearshore Sediment River Mile 6 to 7 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	1.56E-02	9.26E-09	2.31E-04	4.40E-02	2.61E-08	6.51E-04	9.47E-03	5.61E-09	1.40E-04	3.82E-02	2.26E-08	5.66E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	7.49E-01	2.12E-07	7.07E-04	3.35E-01	9.47E-08	3.16E-04	4.19E-01	1.19E-07	3.96E-04	2.81E-01	7.95E-08	2.65E-04
DDx	5.13E-08	3.02E-04	Liver	1.82E-02	9.36E-10	5.51E-06	6.66E-03	3.42E-10	2.01E-06	1.16E-02	5.98E-10	3.51E-06	1.13E-02	5.78E-10	3.40E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.79E-07	5.48E-09	6.02E-05	3.13E-07	6.15E-09	6.76E-05	2.32E-07	4.55E-09	5.00E-05	2.91E-07	5.71E-09	6.28E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	3.94E-07	3.74E-09	2.31E-04	6.67E-07	6.33E-09	3.91E-04	4.49E-07	4.26E-09	2.63E-04	1.59E-06	1.51E-08	9.34E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.11E-06	2.17E-08	2.39E-04	7.08E-07	1.39E-08	1.53E-04	1.81E-06	3.56E-08	3.91E-04	1.95E-06	3.83E-08	4.20E-04
			Total		2.53E-07	1.47E-03		1.48E-07	1.58E-03		1.69E-07	1.24E-03		1.62E-07	2.25E-03

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	1.24E-03	Developmental	9.27E-04	Developmental	1.10E-03	Developmental	1.68E-03
Eye, nails, immune	2.31E-04	Eye, nails, immune	6.51E-04	Eye, nails, immune	1.40E-04	Eye, nails, immune	5.66E-04
Liver	5.51E-06	Liver	2.01E-06	Liver	3.51E-06	Liver	3.40E-06
Reproductive	5.30E-04	Reproductive	6.12E-04	Reproductive	7.05E-04	Reproductive	1.42E-03

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 6 to 7 West			Nearshore Sediment River Mile 7 to 8 East			Nearshore Sediment River Mile 7 to 8 West			Nearshore Sediment River Mile 8 to 9 East		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	1.51E-02	8.95E-09	2.24E-04	2.59E-02	1.54E-08	3.84E-04	1.87E-02	1.11E-08	2.77E-04	1.92E-02	1.14E-08	2.84E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	4.60E-01	1.30E-07	4.35E-04	2.12E-01	6.00E-08	2.00E-04	9.06E-02	2.56E-08	8.55E-05	4.29E-02	1.21E-08	4.05E-05
DDx	5.13E-08	3.02E-04	Liver	3.84E-02	1.97E-09	1.16E-05	5.14E-03	2.64E-10	1.55E-06	6.96E-02	3.57E-09	2.10E-05	4.20E-03	2.15E-10	1.27E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.43E-07	4.76E-09	5.24E-05	3.87E-07	7.59E-09	8.34E-05	2.65E-07	5.20E-09	5.72E-05	1.96E-07	3.84E-09	4.22E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	4.15E-07	3.94E-09	2.43E-04	1.01E-06	9.57E-09	5.91E-04	4.69E-07	4.46E-09	2.75E-04	3.24E-07	3.08E-09	1.90E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	5.27E-06	1.04E-07	1.14E-03	1.25E-06	2.46E-08	2.70E-04	2.09E-05	4.11E-07	4.52E-03	2.80E-07	5.50E-09	6.05E-05
			Total		2.54E-07	2.10E-03		1.17E-07	1.53E-03		4.61E-07	5.23E-03		3.62E-08	6.19E-04

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	1.87E-03	Developmental	1.14E-03	Developmental	4.94E-03	Developmental	3.33E-04
Eye, nails, immune	2.24E-04	Eye, nails, immune	3.84E-04	Eye, nails, immune	2.77E-04	Eye, nails, immune	2.84E-04
Liver	1.16E-05	Liver	1.55E-06	Liver	2.10E-05	Liver	1.27E-06
Reproductive	1.43E-03	Reproductive	9.44E-04	Reproductive	4.85E-03	Reproductive	2.93E-04

Notes:

a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:

1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 8 to 9 West			Nearshore Sediment River Mile 9 to 10 East			Nearshore Sediment River Mile 9 to 10 West		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	5.87E-02	3.48E-08	8.69E-04	2.09E-02	1.24E-08	3.10E-04	1.71E-02	1.02E-08	2.54E-04
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	9.11E-02	2.58E-08	8.60E-05	4.64E-02	1.31E-08	4.38E-05	6.86E-02	1.94E-08	6.48E-05
DDx	5.13E-08	3.02E-04	Liver	2.65E-02	1.36E-09	8.02E-06	2.45E-03	1.26E-10	7.39E-07	4.32E-03	2.22E-10	1.31E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	4.20E-07	8.25E-09	9.07E-05	1.86E-07	3.65E-09	4.02E-05	3.05E-07	5.98E-09	6.57E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	6.31E-07	5.99E-09	3.70E-04	3.09E-07	2.93E-09	1.81E-04	3.99E-07	3.79E-09	2.34E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	7.09E-07	1.39E-08	1.53E-04	2.85E-07	5.59E-09	6.14E-05	3.32E-07	6.52E-09	7.17E-05
			Total		9.01E-08	1.58E-03		3.78E-08	6.37E-04		4.61E-08	6.91E-04

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	7.00E-04	Developmental	3.27E-04	Developmental	4.36E-04
Eye, nails, immune	8.69E-04	Eye, nails, immune	3.10E-04	Eye, nails, immune	2.54E-04
Liver	8.02E-06	Liver	7.39E-07	Liver	1.31E-06
Reproductive	6.14E-04	Reproductive	2.83E-04	Reproductive	3.71E-04

Notes:
a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:
1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Nearshore Sediment River Mile 10 to 11 East			Nearshore Sediment River Mile 10 to 11 West			Nearshore Sediment River Mile 11 to 11.8 East			Nearshore Sediment River Mile 11 to 11.8 West		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)	SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	2.35E-02	1.39E-08	3.48E-04	1.16E-02	6.88E-09	1.72E-04	1.10E-01	6.52E-08	1.63E-03	3.56E-03	2.11E-09	5.28E-05
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	5.78E-02	1.64E-08	5.45E-05	9.85E-02	2.79E-08	9.30E-05	5.17E-02	1.46E-08	4.88E-05	3.12E-02	8.83E-09	2.94E-05
DDx	5.13E-08	3.02E-04	Liver	3.32E-03	1.71E-10	1.00E-06	1.10E-02	5.63E-10	3.31E-06	2.99E-03	1.54E-10	9.03E-07	3.18E-03	1.63E-10	9.60E-07
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	2.59E-07	5.08E-09	5.58E-05	2.53E-07	4.97E-09	5.47E-05	2.24E-07	4.40E-09	4.84E-05	2.72E-07	5.34E-09	5.87E-05
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	5.55E-07	5.27E-09	3.26E-04	5.04E-07	4.78E-09	2.96E-04	3.72E-07	3.53E-09	2.18E-04	2.99E-07	2.84E-09	1.76E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	3.61E-07	7.09E-09	7.79E-05	4.26E-07	8.35E-09	9.18E-05	2.87E-07	5.64E-09	6.20E-05	2.03E-07	3.98E-09	4.37E-05
			Total		4.79E-08	8.63E-04		5.35E-08	7.10E-04		9.36E-08	2.01E-03		2.33E-08	3.61E-04

Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation		Target Endpoint Evaluation	
Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI	Organ	Endpoint HI
Developmental	5.14E-04	Developmental	5.35E-04	Developmental	3.77E-04	Developmental	3.07E-04
Eye, nails, immune	3.48E-04	Eye, nails, immune	1.72E-04	Eye, nails, immune	1.63E-03	Eye, nails, immune	5.28E-05
Liver	1.00E-06	Liver	3.31E-06	Liver	9.03E-07	Liver	9.60E-07
Reproductive	4.59E-04	Reproductive	4.42E-04	Reproductive	3.28E-04	Reproductive	2.78E-04

Notes:
a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Acronyms:
1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

Table B-2c. Calculation of Pre- and Post-Construction SWAC Cancer Risks and Non-Cancer Hazards (All Focused COCs)
Tribal Fisher
Reasonable Maximum Exposure

Scenario Timeframe: Current/Future	Medium: Sediment
Receptor Population: Tribal Fisher	Exposure Medium: Nearshore Surface Sediment
Receptor Age: Adult	Exposure Route: Direct Contact

Constituent	Unit Cancer Risk (a)	Unit Hazard Quotient (a)	Primary Target Organ(s)	Swan Island Lagoon		
				SWAC (mg/kg)	Cancer Risk (a)	Hazard Quotient (a)
total PCB	5.93E-07	1.48E-02	Eye, Nails, Immune	1.04E-01	6.14E-08	1.54E-03
Benzo(a)pyrene-TEQ	2.83E-07	9.44E-04	Developmental	1.76E-01	4.97E-08	1.66E-04
DDx	5.13E-08	3.02E-04	Liver	6.44E-03	3.31E-10	1.94E-06
2,3,7,8-TCDD	1.96E-02	2.16E+02	Reproductive, Developmental	5.08E-07	9.98E-09	1.10E-04
2,3,4,7,8-PeCDF	9.50E-03	5.87E+02	Reproductive, Developmental	1.09E-06	1.04E-08	6.40E-04
1,2,3,7,8-PeCDD	1.96E-02	2.16E+02	Reproductive, Developmental	1.32E-06	2.58E-08	2.84E-04
			Total		1.58E-07	2.74E-03

Notes:
a. The potential carcinogenic risk and noncarcinogenic hazard quotients are calculated per exposure area by multiplying the area EPC by the unit risks and hazard quotients calculated in Table B-2a.

Target Endpoint Evaluation	
Organ	Endpoint HI
Developmental	1.20E-03
Eye, nails, immune	1.54E-03
Liver	1.94E-06
Reproductive	1.03E-03

Acronyms:
1,2,3,7,8-PeCDD = 1,2,3,7,8-pentachlorodibenzo-P-dioxin
2,3,4,7,8-PeCDF = 2,3,4,7,8-pentachlorodibenzofuran
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-P-dioxin
COC = contaminant of concern
CSF = cancer slope factor
DDx = dichlorodiphenyltrichloroethane and its derivatives
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RfD = reference dose
SWAC = spatially weighted average concentrations
TEQ = toxicity equivalence

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